SWIFT FOX CONSERVATION TEAM

Wyoming Game & Fish Department 2003

2003 Annual Report

SWIFT FOX CONSERVATION TEAM
2003 ANNUAL REPORT

COMPILED AND EDITED BY:

Martin Grenier
Wyoming Game and Fish Department

And

Heather Whitlaw
Texas Parks and Wildlife Department

March 2005

Please cite this publication as:

Grenier, M. and H. Whitlaw, editors. 2005. Swift Fox Conservation Team 2003 annual report. Wyoming Game and Fish Department, Lander, Wyoming.

For additional copies, contact:

Terrestrial Native Species Program, 260 Buena Vista, Lander, Wyoming. 82520; (307) 332-2688. This report will be available only in PDF format.

TABLE OF CONTENTS

OVERVIEW

MARTIN GRENIER, editor, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY, 82520.

HEATHER A. WHITLAW, editor, Texas Parks and Wildlife Department, Box 42125 TTU, Lubbock, TX 79409-2125

The Swift Fox Conservation Team (SFCT) was established in1994 by the affected state agencies following the release of the petition to list the swift fox as threatened under the Endangered Species Act (ESA) in 1992. The U.S. Fish and Wildlife Service's (Service) first 12-month finding, in 1995, stated that the swift fox was warranted but precluded for listing by higher priorities. The decision resulted in the swift fox being placed on the ESA Candidate List. This afforded the SFCT additional time to complete and implement the Conservation Assessment and Conservation Strategy for the Swift Fox in the United States (CACS) (Kahn et al. 1997). The CACS was completed in September of 1997.

Since then, the SFCT and the agencies involved have been successful in addressing conservation needs of the swift fox over the last 7 years. In particular, improved management and conservation of the species by members of the SFCT resulted in a more comprehensive accounting of distribution records and a better understanding of habitat requirements. This led to the removal of the swift fox from the ESA Candidate List in January 2001. Over the last 3 years the SFCT has remained committed to precluding the need to list the species under the ESA.

The SFCT members and cooperators have met annually since 1994 to report on their respective state management and research activities. This document represents a compilation of those reports provided by the SFCT in 2003. This is the 9th annual report produced by the SFCT. The purpose of this document is to provide a summary of ongoing species status information, conservation efforts, as well as, state and federal agency progress in achieving goals set forth in the CACS.

LITERATURE CITED

Kahn, R., L. Fox, P. Horner, B. Giddings, and C. Roy, editors. 1997. Conservation assessment and conservation strategy for swift fox in the United States. Colorado Division of Wildlife, Ft. Collins, Colorado.

SWIFT FOX CONSERVATION TEAM

revised June 2004

STATE AGENCIES:

Kansas

Matt Peek

Kansas Department of Wildlife and Parks
P.O. Box 1525
Emporia, KS 66801
Phone: 620-342-0658
FAX: 620-342-6248
email: mattp@wp.state.ks.us

Montana

Brian Giddings

Montana Fish Wildlife and Parks
PO Box 200701
Helena, MT 59620-0701
Phone: 406-444-0042
FAX: 406-444-4952
email: bgiddings@state.mt.us

Nebraska

Mike Fritz

Nebraska Game and Parks Commission
2200 N. 33rd
Lincoln, NE 68503
Phone: 402-471-5419
FAX: 402-471-5528
email: mfritz@ngpc.state.ne.us

New Mexico

Chuck Hayes

New Mexico Department of Game and Fish
PO Box 25112
Santa Fe, NM 87504
Phone: 505-476-8101
FAX: 505-476-8128
email: CLHayes@state.nm.us

Oklahoma

Julianne Whitaker Hoagland

Oklahoma Dept of Wildlife Conservation
P.O. Box 53465
Oklahoma City, OK 73152
Phone: 405-522-0189
FAX: 405-521-6535
email: jhoagland@odwc.state.ok.us

South Dakota

Eileen Dowd Stukel

South Dakota Dept Game, Fish and Parks
523 E Capitol
Pierre, SD 57501
Phone: 605-773-4229
FAX: 605-773-6245
email: eileen.dowdstukel@state.sd.us

Texas

Heather Whitlaw

Texas Parks and Wildlife Dept.
Box 42125, TTU
Lubbock, TX 79409-2125
Phone: 806-742-6888, ext 242
Fax: 806-742-2280
email: heather.whitlaw@tpwd.state.tx.us

Wyoming

Martin Grenier

Wyoming Game and Fish Department
260 Buena Vista
Lander, WY 82520
Phone: 307-332-2688
FAX: 307-332-6669
email: martin.grenier@wgf.state.wy.us

North Dakota

Jacquie Ermer
North Dakota Game and Fish Department
406 Dakota Ave.
Riverdale, ND 58565
Phone: 701-654-7475, ext. 42
FAX: 701-654-7503
email: jermer@state.nd.us

Colorado

Frances Pusateri
Colorado Division of Wildlife
317 W. Prospect Rd.
Fort Collins, CO 80526
Phone: 970-472-4336
FAX: 970-472-4458
email: francie.pusateri@state.co.us

FEDERAL AGENCIES

U.S. Fish and Wildlife Service

Pete Gober
USFWS Ecological Service
420 S. Garfield Suite 400
Pierre, SD 57501
Phone: 605-224-8693 ext 24
FAX: 605-224-9974
email: pete_gober@fws.gov

U.S.G.S./Biological Resources Division

Marsha A. Sovada
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, ND 58401
Phone: 701-253-5506
FAX: 701-253-5553
email: marsha_sovada@usgs.gov

U.S. Forest Service

Bob Hodorff
Wildlife Biologist
Fall River Ranger District
P.O. Box 732
Hot Springs, SD 57747
Phone: 605-745-4107
FAX: 605-745-4179
email: rhodorff@fs.fed.us

Bureau of Land Management

Cal McCluskey
Bureau of Land Management
Washington Office – W. Field Staff
1387 S. Vinnell Way
Boise, ID 83709
Phone:
FAX:
email: cal_mccluskey@blm.gov

National Park Service

Dan Licht
NPS
Badlands National Park
PO Box 6
Interior SD 57750
Phone: 605 433-5266
FAX:
email: dan_licht@nps.gov

NRCS

Vacant

USDA/AHIS/Wildlife Services
Jeffrey Green
WS Western Regional Office
2150 Centre Ave, Bldg. B
Mail Stop 3W9
Fort Collins, CO 80526
Phone: 970-494-7453
FAX: 970-494-7455
email: jeffrey.s.green@aphis.da.gov

CANADA

Pat Fargey
Grasslands National Park
Box 150
Val Marie, SK S0N 2T0
Phone: 306-298-2166 ext 224
FAX: 306-298-4505
email: pat_fargey@pc.gc.ca

Axel Moehrenschlager
Centre for Conservation Research
Calgary Zoo
1300 Zoo Road NE
Calgary, AB T2E 7V6
Phone: 403-232-7771
email: axelm@calgaryzoo.ab.ca

Team Chairs

Jacquie Ermer – ND (Chair)
Matt Peek – KS (Co-Chair)

Committee Chairs

Research - Marsha Sovada - USGS
Habitat - Julianne Hoagland - OK
Education - Eileen Dowd Stukel -SD

SWIFT FOX CONSERVATION TEAM

PARTICIPATING COOPERATORS

Revised June 2004

Lu Carbyn
Canadian Wildlife Service
4999 98th Ave.
Edmonton, AB T6B 2X3
Phone: 403-435-7357
FAX: 403-435-7359
email: lu.carbyn@ec.gc.ca

Julie Moore
Bureau of Land Management
1849 C St. NW, LS-204
Washington, DC 20240
Phone: 202-452-7746
FAX: 202-452-7702
Email:

Jack Grisham
Smithsonian's Natl Zool. Park
3001 Connecticut Ave. NW
Washington, D.C. 20008
Phone: 202-673-4799
Fax: 202-673-4766
Email: grishamj@si.edu

Robert Harrison
University of New Mexico
Dept. of Biology
Albuquerque, NM 87131
Phone: 505-277-3411
FAX: 505-277-0304
email: rharison@unm.edu

Fred Lindzey
Wyoming Fish and Wildlife Coop Unit
Box 3166
Laramie, WY 82071
Phone: 307-766-5415
FAX: 307-766-5400
email: flindzey@uwyo.edu

Bill Andelt
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins, CO 80523
Phone: 970-491-7093
FAX: 970-491-5091
email: billan@picea.cnr.colostate.edu

Steve Brechtel
Alberta Fish and Wildlife Division
9945-108 Street
Edmonton, AB T5K 2G9
Phone: 403-422-9535
FAX: 403-422-9785
email:

Greg Linscombe
Fur Resources Committee
International Association of Fish & Wildlife Agencies
Louisiana Dept. of Wildlife and Fisheries
2415 Darnell Road
New Iberia, LA 70560
Phone: 318-373-0174
Email:

Greg Schroeder
Badlands National Park
PO Box 6
Interior, SD 57750
Phone: 605-433-5269
Email: greg_schroeder@nps.gov

Kyran Kunkel
Turner Endangered Species Fund
1123 Research Drive
Bozeman, MT 59718
Phone: 406-556-8500
FAX: 406-556-8501
Email: kyran@montana.net

Kevin Honness
Turner Endangered Species Fund
PO Box 1118
Phone: 605-945-2655
Fort Pierre, SD 57532
email: honness@wcenet.com

Sian Waters
Cochrane Ecological Institute
PO Box 484
Cochrane, AB T4C 1A7
Phone: 403-932-5632
FAX: 403-932-6303
Email: sian.s.waters@hotmail.com

Clio Smeeton
Cochrane Ecological Institute
PO Box 484
Cochrane, AB T4C 1A7
Phone: 403-932-5632
FAX: 403-932-6303
Email: cei@cadvision.com

Minette Johnson
Defenders of Wildlife
114 West Pine Street
Missoula, MT 59802
Phone: 406-549-4103
FAX: 406-549-3306
Email: mjohnson@defenders.org

PROTOCOL FOR SWIFT FOX SPECIMEN SUBMISSION FOR LONG-TERM STORAGE OF GENETIC AND OTHER MATERIALS

SWIFT FOX CONSERVATION TEAM

INTRODUCTION

During the 2002 Swift Fox Conservation Team (SFCT) Annual Meeting, the SFCT identified a need to gather genetic material for swift fox (*Vulpes velox*) throughout its range and agreed that collecting these samples should be a priority. Moreover, the SFCT agreed that genetic material should be gathered in a consistent matter and stored at one common location. The topic was again discussed at the 2003 Annual Meeting. Several locations were discussed by the SFCT before deciding to utilize the University of New Mexico (UNM). The SFCT, with the assistance of Dr. J. Dragoo, proceeded to develop the following protocol for submitting genetic material to the UNM, MSB Division of Genomic Resources. UNM has agreed, on behalf of the SFCT, to serve as the repository for swift fox genetic material until such a time when funding and/or future research efforts are developed to analyze the samples (Attachment 1).

The SFCT identified 9 target regions for collection of swift fox genetic material (Map 1). The SFCT believes that collection and storage of a minimum of 30 samples from each target region is ideal. On-going translocation efforts present a unique opportunity to acquire the minimum samples for Regions 3 (Wyoming) and 5 (SE Colorado). In such cases where genetic samples are readily available, it is recommended that samples continue to be collected if possible.

Although the SFCT has identified collecting swift fox genetic material across the range as a priority, it also acknowledges that there exists a lack of resources to specifically accomplish this task, which may preclude accomplishment of the task in other areas. The SFCT has agreed to collect samples from swift fox in the remaining areas as resources and time permit. All future research and translocation efforts should be encouraged to submit genetic samples to UNM using the developed protocol.

PROTOCOL

It is imperative that the appropriate Federal Hazardous Material (HAZMAT) packaging and shipping policies be followed prior to shipping packages containing liquid nitrogen, ethanol alcohol and dry ice. The following protocol only covers storage of specimens and DOES NOT address Federal Department of Transportation HAZMAT shipping policies. Please contact the appropriate personnel within your area or UNM for additional information.

All samples should be collected following the tissue-specific procedures outlined in Table 1. Each sample needs to be clearly marked (black permanent ink) with a unique

identifying number and date (date of collection or death). All samples need to be accompanied by a standard Division of Genomic Resources (DGR) Form (Contact UNM – see below)

Skins and skeletons may be sent whole. All skins, skeletons and tissues or ancillary specimens originating from the same animal should have the same unique number with accompanying DGR data sheets (Attachment 2). Specimens and associated data (including permits showing that they were legally collected should be shipped to the following address:

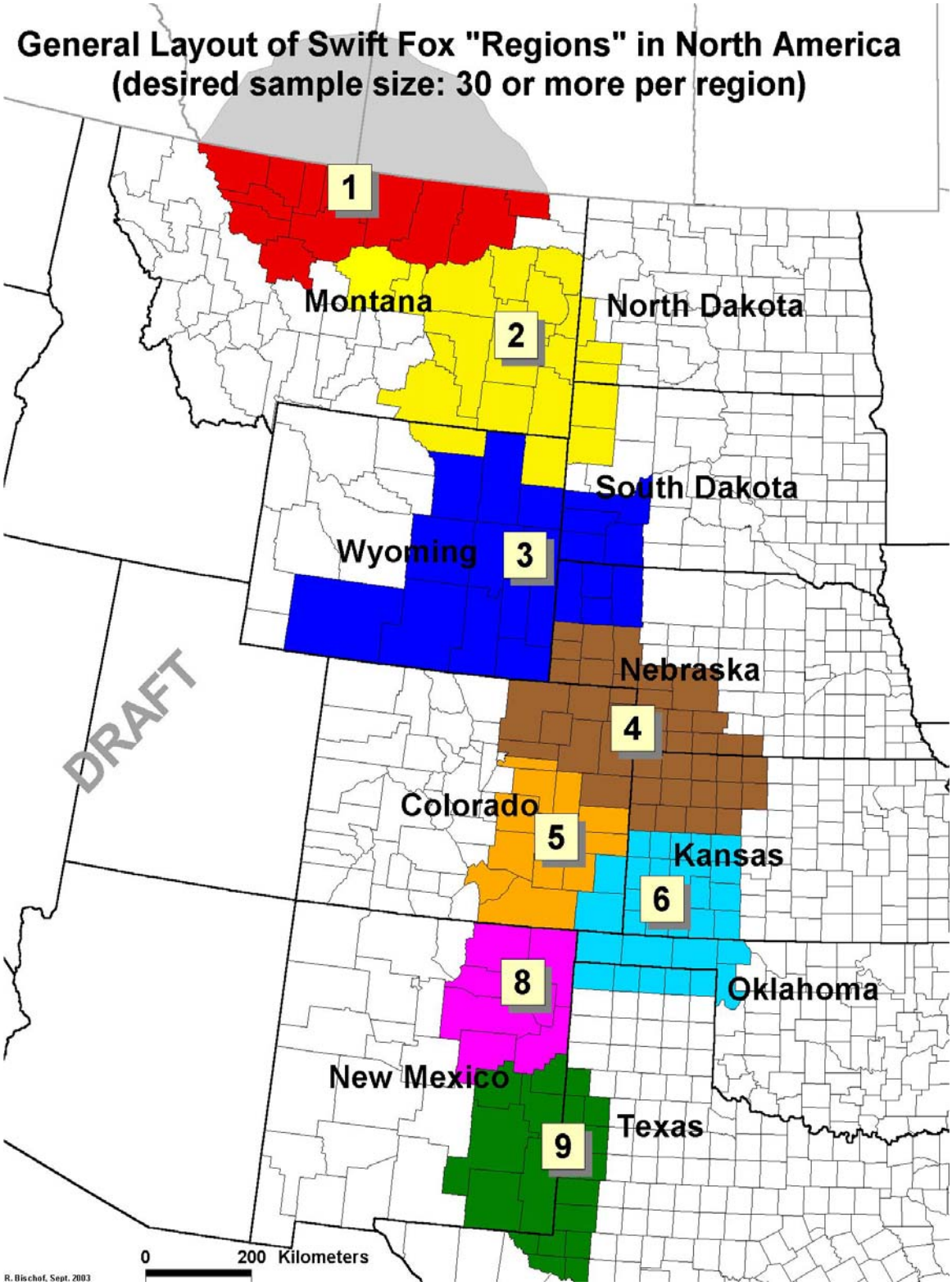
University of New Mexico
Department of Biology
MSB-Divsion of Genomic Resources
167 Castetter Hall
Albuquerque, NM 87131
Attention: Cheryl Parmenter (Phone: 505-277-3411)

Table 1. Recommended storage and shipping procedures for submitting genetic materials to the University of New Mexico, MSB Division of Genomic Resources, 2003.

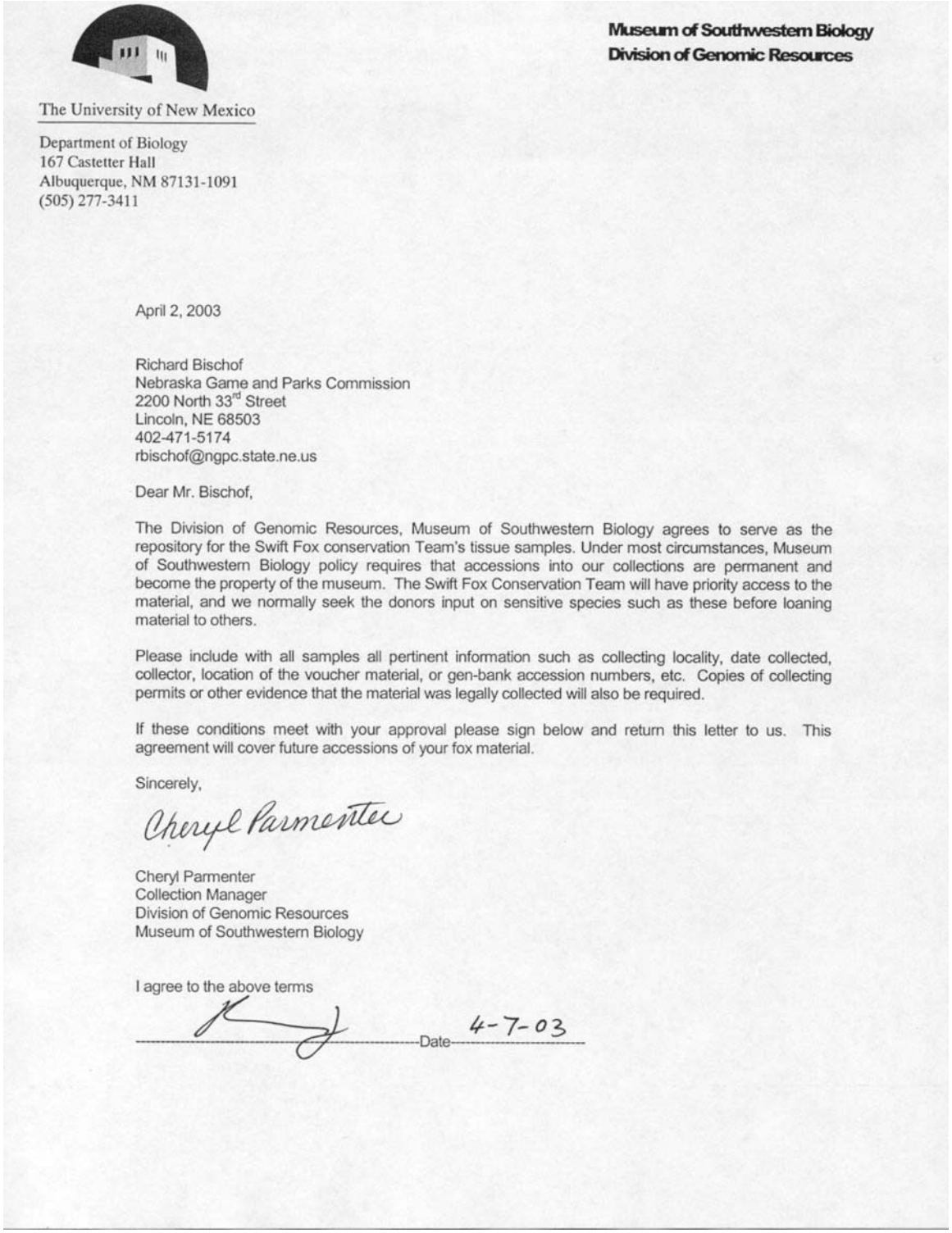
Specimen Type	Storage Options	Shipping
Tissue	System 100 cryogenic vial (1.5ml), in liquid nitrogen	➔ On dry ice
	System 100 cryogenic vial (1.5ml), 90% Ethanol	➔ At room temperature
Blood	System 100 cryogenic vial (1.5ml), in liquid nitrogen	➔ On dry ice
	In EDTA tube (purple top), refrigerated	➔ On wet ice
Hair	System 100 cryogenic vial (1.5ml), in liquid nitrogen	➔ On dry ice
	System 100 cryogenic vial (1.5ml), dry	➔ At room temperature
Bone	System 100 cryogenic vial (1.5ml), in liquid nitrogen	➔ On dry ice
	System 100 cryogenic vial (1.5ml), dry	➔ At room temperature
	System 100 cryogenic vial (1.5ml), fresh	➔ On wet ice
Feces	System 100 cryogenic vial (1.5ml) in liquid nitrogen	➔ On dry ice
	System 100 cryogenic vial (1.5ml), dry	➔ At room temperature
	System 100 cryogenic vial (1.5ml), fresh	➔ On wet ice

Note - It is imperative that the appropriate Federal Hazardous Material (HAZMAT) packaging and shipping policies be followed prior to shipping packages containing liquid nitrogen, ethyl alcohol and dry ice. The following protocol only covers storage of specimens and DOES NOT address Federal Department of Transportation HAZMAT shipping policies. Please contact the appropriate personnel within your area or at the University of New Mexico (UNM) for additional information.

Map 1. Target regions for collection of swift fox (*Vulpes velox*) genetic material as identified by the Swift Fox Conservation Team, 2003.



Attachment 1. University of New Mexico letter of support.



The University of New Mexico

Department of Biology
167 Castetter Hall
Albuquerque, NM 87131-1091
(505) 277-3411

Museum of Southwestern Biology
Division of Genomic Resources

April 2, 2003

Richard Bischof
Nebraska Game and Parks Commission
2200 North 33rd Street
Lincoln, NE 68503
402-471-5174
rbischof@ngpc.state.ne.us

Dear Mr. Bischof,

The Division of Genomic Resources, Museum of Southwestern Biology agrees to serve as the repository for the Swift Fox conservation Team's tissue samples. Under most circumstances, Museum of Southwestern Biology policy requires that accessions into our collections are permanent and become the property of the museum. The Swift Fox Conservation Team will have priority access to the material, and we normally seek the donors input on sensitive species such as these before loaning material to others.

Please include with all samples all pertinent information such as collecting locality, date collected, collector, location of the voucher material, or gen-bank accession numbers, etc. Copies of collecting permits or other evidence that the material was legally collected will also be required.

If these conditions meet with your approval please sign below and return this letter to us. This agreement will cover future accessions of your fox material.

Sincerely,

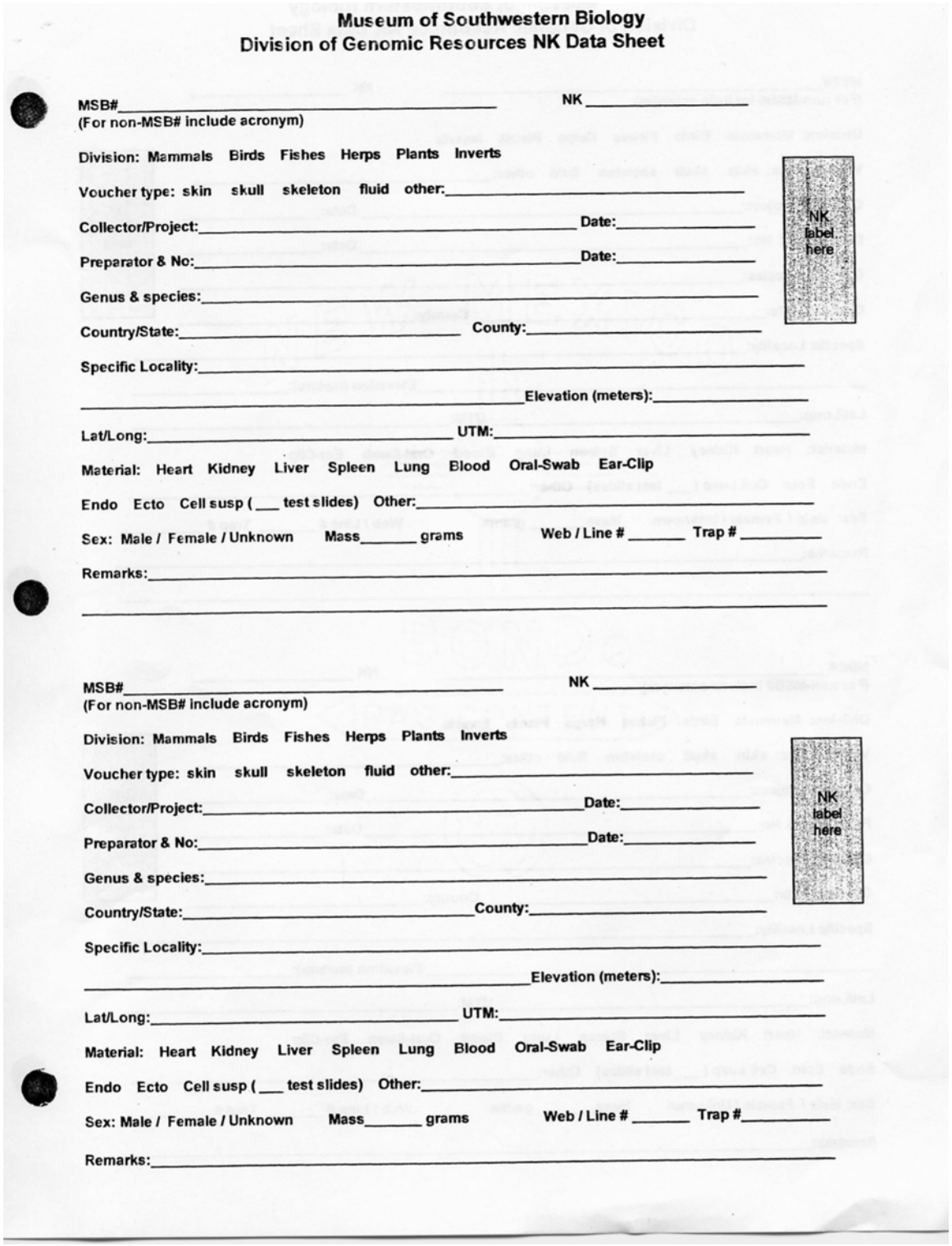
Cheryl Parmenter

Cheryl Parmenter
Collection Manager
Division of Genomic Resources
Museum of Southwestern Biology

I agree to the above terms

_____ Date 4-7-03

Attachment 2. Specimen submission form.



Museum of Southwestern Biology
Division of Genomic Resources NK Data Sheet

MSB#_____ NK _____
(For non-MSB# include acronym)

Division: Mammals Birds Fishes Herps Plants Inverts

Voucher type: skin skull skeleton fluid other:_____

Collector/Project:_____ Date:_____

Preparator & No:_____ Date:_____

Genus & species:_____

Country/State:_____ County:_____

Specific Locality:_____

_____ Elevation (meters):_____

Lat/Long:_____ UTM:_____

Material: Heart Kidney Liver Spleen Lung Blood Oral-Swab Ear-Clip

Endo Ecto Cell susp (___ test slides) Other:_____

Sex: Male / Female / Unknown Mass_____ grams Web / Line # _____ Trap # _____

Remarks:_____

_____

NK label here

MSB#_____ NK _____
(For non-MSB# include acronym)

Division: Mammals Birds Fishes Herps Plants Inverts

Voucher type: skin skull skeleton fluid other:_____

Collector/Project:_____ Date:_____

Preparator & No:_____ Date:_____

Genus & species:_____

Country/State:_____ County:_____

Specific Locality:_____

_____ Elevation (meters):_____

Lat/Long:_____ UTM:_____

Material: Heart Kidney Liver Spleen Lung Blood Oral-Swab Ear-Clip

Endo Ecto Cell susp (___ test slides) Other:_____

Sex: Male / Female / Unknown Mass_____ grams Web / Line # _____ Trap #_____

Remarks:_____

NK label here

CAPTIVE SWIFT FOX POPULATIONS: AN UPDATE ON THEIR FUTURE WITHIN THE AMERICAN ZOO AND AQUARIUM ASSOCIATION

SWIFT FOX CONSERVATION TEAM

SUMMARY

The American Zoo and Aquarium Association (AZA) Canid Taxon Advisory Group (TAG) initially approached the Swift Fox Conservation Team (SFCT) during its annual meeting in September 2003 to discuss captive swift fox, conservation needs and the future of the species within the AZA. The AZA was looking to develop a cooperative conservation approach between the zoo community, that have responsibilities for captive swift fox, and wildlife/land management agencies, that have responsibilities for wild swift fox populations.

The AZA reported that it has 60 swift fox in 18 AZA institutions and that these swift fox currently do not have a formal program structure, such as a Species Survival Plan (SSP). The captive swift fox are currently managed under a Population Management Plan (PMP), which lacks mandatory enforcement and regards management decisions as voluntary. The AZA also expressed concern over availability of space and is considering phasing out swift fox if the captive swift fox do not meet a specific conservation need in order to accommodate program needs of other species.

DISCUSSION

Although the SFCT recognizes the opportunities and need for developing a cooperative conservation approach with the zoo community, unfamiliarity with the AZA program structures has hampered the SFCT. In recognition of this fact, the SFCT drafted a letter to the AZA in May 2004, outlining interests, potential areas of cooperation, and concerns (Attachment 1). The letter also solicits additional help from the AZA. Since the AZA is most familiar with their program structure, the SFCT requested that the AZA provide feedback to the SFCT as to which program structure would best address our mutual needs. The SFCT hopes that the AZA will appoint a representative to the SFCT to facilitate program development.

Since May 2004, additional concerns and issues have been raised that further strengthen the need to develop a formal program structure for swift fox in captivity. The lack of enforcement under the current voluntary management directions could potentially result in conflict between the zoo community and the SFCT. Recently, the SFCT has expressed concern over the use of captive animals as a source for re-introductions. Moreover, the SFCT is concerned about the use of these animals to initiate swift fox populations that may not be consistent with current SFCT objectives and conservation priorities.

Both groups agree that the potential for conflicts must be greatly reduced and/or eliminated entirely and steps must be taken to develop a cooperative conservation effort. Varying AZA program structures are being explored and discussed. The SFCT and the AZA are planning to discuss the issue further at the next SFCT annual meeting. Undoubtedly, as these issues and concerns are resolved conservation of wild swift fox will benefit greatly from a properly managed captive swift fox population.

Attachment 1. Letter from the SFCT to the AZA.

21 May 2004

Karen L. Bauman
Laboratory Manager, Research Department
Saint Louis Zoo
One Government Drive
Saint Louis, MO 63110

Ms. Bauman:

On behalf of the Swift Fox Conservation Team (SFCT), I would like to thank you again for your attendance at our meeting in September 2003 in Ft. Collins, Colorado. You attended on behalf of the American Zoo Association (AZA), its institutional members, and its professional associates. Your expressed interest was in respect to potential cooperative efforts to support the conservation of this species which might involve both the zoo community and the wildlife/land management agencies that have responsibilities where wild populations occur.

The SFCT believes that the status of the swift fox is relatively secure in the wild, but that continued attention to its conservation is appropriate. This view is evidenced by the ongoing involvement of the many participants in SFCT activities. Nevertheless, the involvement of additional expertise from parties affiliated with the AZA would be useful and most welcome. We are unsure how to best utilize the AZA resources to further swift fox conservation. This species is not at risk of extinction, but neither is it secure throughout its historic range. The following suggestions assume a collaboration of presumed interests and resources between the SFCT and the AZA affiliates.

1. Maintenance of an appropriate size captive population to provide a resource for potential research related to husbandry techniques, genetic inquiries, etc.
    a. Would a Regional Collection Plan be appropriate? Would this address both source populations from the wild and cooperating institutions?
    b. Would the development of a Studbook be appropriate?
    c. Would an Education and Display effort be appropriate?
    d. Would a current List of Captive Specimens in AZA institutions be available?

2. Continuing contributions from the AZA conservation and science entities may be valuable to swift fox conservation efforts via input into annual SFCT initiatives and meetings, e.g. participation by one or more of the following: a Science Advisory Group, the Canid Taxon Advisory Group, a Group Population Management effort, a Population Management Plans Studbook, a Species Survival Plan. One area of inquiry might be a review of current in situ conservation approaches for swift fox in comparison to other species with which the AZA has had experience.

The SFCT requests suggestions from the AZA as to its interest in this species and the efforts in which it may be interested. Perhaps the best approach to initiate this effort and to explore the level of mutual interest would be for the AZA to query its members to determine if one of them would serve as a cooperative member of the SFCT and advise it of potential support.

Thank you again for your interest. We look forward to working with the AZA.

Sincerely,

// signed //

Jacquie Ermer
Chair, Swift Fox Conservation Team

ANALYSIS OF SWIFT FOX FUNDING AND EXPENDITURES

SWIFT FOX CONSERVATION TEAM

INTRODUCTION

At the September 2003 Annual Meeting of the Swift Fox Conservation Team (SFCT), SFCT members discussed funding and expenditure issues for swift fox (or swift fox-related) conservation and management. These discussions and the proposed analyses and products were intended to be modeled after recent and similar efforts conducted by the Black-footed Ferret Recovery and Implementation Team (P. Gober, USFWS, pers. comm.). As a result of these discussions, total funding and expenditures (including cash and in-kind contributions) on swift fox per year were collected by agency (state, federal) and broken down by source into federal and non-federal (e.g., state, NGO) categories. The goal of the analysis was to help the SFCT determine how much, if any, of the non-federal funding is currently available and identify expenditure commitments in order to assess how much non-federal funding is potentially available for matching federal funds.

METHODS

Swift fox funding and expenditure data were requested from all SFCT members. These data were compiled and analyzed by member organization and funding types.

RESULTS

Funding and expenditure data were received from 8 SFCT members (NM, ND, MT, OK, KS, WY, TX, and NPS [Badlands National Park]) (Table 1). Swift fox expenditures from traditional federal funding sources (Pittman-Robertson, BLM grants, NPS base funding and grants, State Wildlife Grants, and Section 6 funds) comprised 78% ($1.01M) of expenditures (Figure 1). State funds comprised 8% ($107,727) of swift fox expenditures, and other non-federal sources (primarily state and provincial in-kind contributions) comprised 14% ($188, 693) of expenditures (Figure 1). Activities funded by expenditures included graduate student research, statewide distribution surveys, population censuses, track surveys, restoration projects, and contributions to larger efforts and partnerships (i.e., SFCT habitat project that was funded through a NFWF grant and subsequently implemented by USGS staff; a NFWF proposal submitted by Turner Endangered Species Fund) (Table 2). As of June 2004, we project that there will be $16,000 of unallocated non-federal funds available for federal match in 2005. A minimum of $2,500 will also be available in 2006, for a combined available total of $18,500.

DISCUSSION

In order to accomplish future range-wide projects, the SFCT will undoubtedly have to develop additional potential funding sources. This analysis was initiated in order to identify potential sources of matching funds (i.e., non-federal and non-allocated). The results of this exercise have brought to light the issue that little unallocated non-federal funding is currently available for federal match, and even less will be available in the immediate future. It is projected that over the next 2 years, $18,500 will be available to the SFCT as matching funds. However, it should be pointed out, that this projected available funding comes from only 2 states. In 2005, Wyoming generated approximately 62% ($10,000) and Oklahoma generated approximately 38% (6,000) of these available funds. The Wyoming Game and Fish Department has in previous years made these funds available to both the SFCT (2002) and the Turner Endangered Species Fund (2003 and 2004) as match to benefit swift fox conservation efforts; however, the Wyoming Game and Fish Department anticipates funding changes and it is unlikely that similar funds will be available in the future. (B. Oakleaf, Wyoming Game and Fish Department, personal communication).

This analysis also allowed us to investigate prior sources of federal funding. National Park Service grants and base budget allocations contributed the largest amount of federal funding for swift fox management over a 6-year period in Badlands National Park ($ 316,800 total; Table 1). Other federal funding for swift fox management, conservation and research was provided by BLM grants ($101,500 over 2 years in MT), Pittman-Robertson reimbursements ($66,487 over 7 years in ND, MT, and KS), State Wildlife Grant grants ($40,673 over 3 years in TX), and Section 6 grants ($25,719 over 4 years in TX) (Table 1). It is apparent that a diversity of available funds were used by state and federal agencies for swift fox programs. However, it is also apparent that "soft money" sources (NPS, BLM, Section 6, and SWG grants) comprised the majority of federal funds spent. There is a need for additional stable sources of funding (i.e., in addition to Pittman-Robertson funds) to support swift fox conservation and management. The SFCT hopes that the new State Wildlife Grants program will help fill this void by providing a more stable source of funding for swift fox management and conservation activities.

Table 1. State (NM, ND, MT, OK, KS, WY, and TX) and federal (National Park Service-Badlands NP) agency funding and expenditures (1999 through 2008), in addition to available non-federal match, for swift fox conservation and management.

State or Federal Agency	Year	Total	Federal Funds	State Funds	Other Non-Federal Funds	Federal Source	Available Non-Federal Match
NM	2003	$22,615	$16,961	$5,654			
ND	1999	$1,000	$750	$250		Pittman-Robertson	
ND	2000	$1,000	$750	$250		Pittman-Robertson	
ND	2001	$1,850	$1,388	$462		Pittman-Robertson	
ND	2002	$2,700	$2,025	$675		Pittman-Robertson	
ND	2003	$1,800	$1,350	$450		Pittman-Robertson	
MT	1996	$25,000	$18,750	$6,250		Pittman-Robertson	
MT	1997	$25,000	$18,750	$6,250		Pittman-Robertson	
MT	1999	$5,000	$3,750	$1,250		Pittman-Robertson	
MT	2000	$249,000	$99,000		$150,000	BLM grant	
MT	2001	$5,000	$2,500	$2,500		BLM grant	
MT	2002	$5,000		$5,000			
OK	2000	$26,800	$20,100		$6,700		
OK	2001	$21,409	$13,915		$7,493		
OK	2002	$9,961	$6,185		$3,777		
OK	2003	$27,380	$19,097		$7,196		
OK	2004	$20,106	$15,080		$5,027		
OK	2005	$24,000	$18,000		$6,000		$6,000
OK	2006	$10,000	$7,500		$2,500		$2,500
KS	2001	$962	$722	$240		Pittman-Robertson	
KS	2002	$12,500	$2,275	$10,225			
KS	2003	$24,395	$18,252	$6,143		Pittman-Robertson	
WY	2002	$10,000		$10,000			
WY	2003	$10,000		$10,000			
WY	2004	$10,000		$10,000			
WY	2005	$10,000		$10,000			$10,000
TX	2000	$11,430	$8,573	$2,857		Section 6 grant	
TX	2001	$11,430	$8,573	$2,857		Section 6 grant	

State or Federal Agency	Year	Total	Federal Funds	State Funds	Other Non-Federal Funds	Federal Source	Available Non-Federal Match
TX	2002	$11,430	$8,573	$2,857		Section 6 grant	
TX	2005	$18,150	$13,613	$4,537		SWG	
TX	2006	$21,780	$16,335	$5,445		SWG	
TX	2007	$14,300	$10,725	$3,575		SWG	
NPS (Badlands NP)	2000	$1,000	$1,000			NPS (Park's Base Budget)	
NPS (Badlands NP)	2001	$1,000	$1,000			NPS (Park's Base Budget)	
NPS (Badlands NP)	2002	$1,000	$1,000			NPS (Park's Base Budget)	
NPS (Badlands NP)	2003	$118,800	$118,800			NPS grant (soft funding)	
NPS (Badlands NP)	2004	$125,000	$125,000			NPS grant (soft funding)	
NPS (Badlands NP)	2005	$70,000	$70,000			NPS grant (soft funding)	
NPS (Badlands NP)	2006	$113,330	$113,330			NPS grant (SUBMITTED)	
NPS (Badlands NP)	2007	$113,330	$113,330			NPS grant (SUBMITTED)	
NPS (Badlands NP)	2008	$113,330	$113,330			NPS grant (SUBMITTED)	
TOTAL		**$1,307,788**	**$1,010,282**	**$107,727**	**$188,693**		

Table 2. State (MT, KS, WY, and TX) and federal (National Park Service-Badlands NP) agency uses of available federal and non-federal funding and expenditures (1999 through 2008).

State	Year	Total spent	Activity Funded
MT	1996	$25,000	Graduate Student Research
MT	1997	$25,000	Graduate Student Research
MT	1999	$5,000	Statewide Distribution Survey
MT	2000	$249,000	Population Census
MT	2001	$5,000	Statewide Distribution Survey
MT	2002	$5,000	Statewide Population Survey
KS	2002	$12,500	Non-reimbursable payment for analysis of track survey data
KS	2003	$24,395	Track survey
WY	2003	$10,000	State funds used to match against the SFCT habitat project
WY	2004	$10,000	State funds used to match against the TESF NFWF proposal
TX	2000	$11,430	Graduate research on Effects of Coyotes on Distribution, Productivity, and Survival of SF in TX Panhandle
TX	2001	$11,430	Graduate research on Effects of Coyotes on Distribution, Productivity, and Survival of SF in TX Panhandle
TX	2002	$11,430	Graduate research on Effects of Coyotes on Distribution, Productivity, and Survival of SF in TX Panhandle
TX	2005	$18,150	Distribution Survey
TX	2006	$21,780	Distribution Survey
TX	2007	$14,300	Distribution Survey
NPS (Badlands NP)	2000-02	$3,000	Travel to SFCT meetings and limited personnel time
NPS (Badlands NP)	2003-05	$313,800	Swift Fox Restoration Project
NPS (Badlands NP)	2006-08	$339,990	Submitted funding request to evaluate reintroduction project

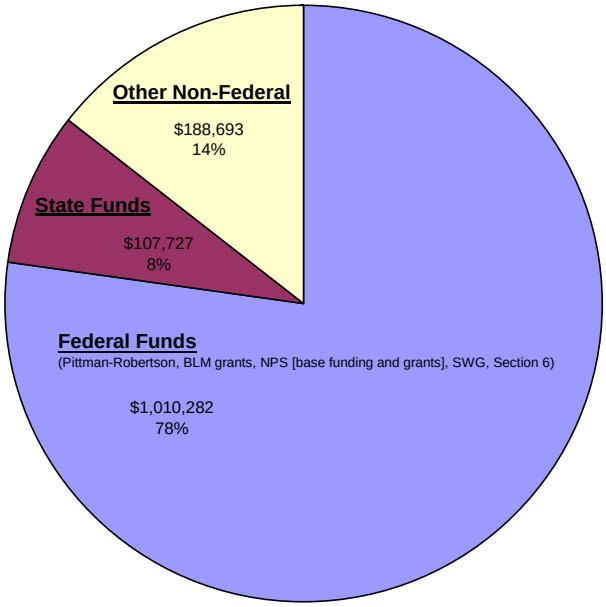


Figure 1. Total swift fox expenditures for NM, ND, MT, OK, KS, WY, TX and NPS (Badlands NP) 1999-2008.

26 January 2004

Dr. Jay Hestbeck
Director, Northern Prairie Wildlife Research Center
US Geological Survey
8711 37th St. SE
Jamestown, ND 58401

Dear Dr. Hestbeck:

The Swift Fox Conservation Team (SFCT) would like to recognize the support of the USGS Northern Prairie Research Center and, in particular, the dedication of Marsha Sovada. The SFCT is comprised of state and federal agencies within the historic range of the swift fox including representation from U.S. Geological Survey. The SFCT was organized in response to the U.S. Fish and Wildlife Service finding that the swift fox was warranted for federal listing under the Endangered Species Act. The swift fox was delisted in 2001, but the primary SFCT mission of ensuring the long-term conservation of swift fox remains. The SFCT is the primary entity ensuring coordination, prioritization, and scientific soundness on all aspects of swift fox management and conservation.

Marsha has done an excellent job of coordinating with the SFCT and providing essential support, guidance, and expertise during the team's decision-making processes. She has been an integral player in accomplishing many of the objectives and tasks identified in the original Swift Fox Conservation Strategy. Marsha also has functioned as chair of the Research Committee and has led the way for several important projects. One such project includes maintaining a central data file of swift fox distribution and developing a habitat model for swift fox. Marsha's effort and insight have been invaluable to the team and to the conservation of swift fox.

Continued conservation of swift foxes and their associated habitats can be achieved through a coordinated and cooperative management approach, utilizing both state and federal resources. The SFCT sincerely appreciates Marsha's dedication to our mission and to the welfare of swift fox. We also appreciate and look forward to continued support from U.S. Geological Survey throughout this important effort.

Sincerely,

// s*igned* //

Jacquie Ermer
Chair, Swift Fox Conservation Team

C.C. Dr. J. Larry Ludke

27 February 2004

Don Childress
Wildlife Division Administrator
Montana Fish, Wildlife & Parks
P.O. Box 200701
Helena, MT 59620-0701

Dear Mr. Childress:

The Swift Fox Conservation Team (SFCT) is a multi-agency group formed in 1994 by ten state wildlife agencies within the historic swift fox range. The group formed in response to a U.S. Fish and Wildlife Service finding that the species was warranted for federal listing under the Endangered Species Act. The primary purpose of the SFCT was to compile existing information, collect new biological data, and implement necessary monitoring and management programs to secure the future of this species and prevent the need for federal protection. Swift fox conservation activities in member states, including Montana, are guided by a conservation strategy document that outlines actions needed for species restoration and habitat conservation. As a result of the SFCT's efforts and new status information, the swift fox was removed from the federal listing designation in 2001. Nonetheless, the SFCT mission remains and the team continues to work cooperatively to ensure long-term conservation of swift fox on local and national levels.

As the chairperson of the SFCT, I would like to commend your agency and the Montana FWP Commission for the acquisition of a critical conservation easement on the Gordon Cattle Company in north-central Montana. Swift fox have recently re-colonized this area, and the state's protection of large tracts of private rangeland will be a key component to the restoration of this species. In fact, preservation of remaining short-grass prairie habitats is a primary conservation strategy in our team's planning document and is an essential component of swift fox conservation. This is an outstanding example of how a state habitat protection program can benefit prairie wildlife species as well as private landowners and also demonstrates that state management actions can in fact preclude federal protection efforts.

Again, the SFCT strongly endorses this action by the Montana FWP Commission to preserve in perpetuity the prairie grasslands of the Gordon Cattle Company conservation easement. This and similar efforts will ensure the long-term conservation of swift fox in Montana.

Sincerely,

// s*igned* //

Jacquie R. Ermer
Chair, Swift Fox Conservation Team

SWIFT FOX INVESTIGATIONS IN KANSAS 2003

MATT PEEK, Kansas Department of Wildlife and Parks, 1830 Merchant, Emporia, KS 66801
(phone: 620-342-0658; email: mattp@wp.state.ks.us)

INTRODUCTION

Swift fox populations and harvests are monitored through several techniques in Kansas. The most reliable and important of these include annual the roadside track survey and pelt tagging records. Additionally, Kansas Department of Wildlife and Parks (KDWP) employees are asked to record all swift fox observations throughout the entire year. These three techniques have documented swift fox in 22 Kansas counties since 1999.

ROADSIDE TRACK SURVEYS

Systematic roadside track surveys were first conducted from 1997 to 1999. A second survey period was initiated in 2002, with the intent to survey for three consecutive years as was done previously. In 2003, approximately 191 townships were surveyed in 21 western Kansas counties. Analysis on these data has not yet been completed. In 2004, surveys will be conducted in those townships where swift fox were surveyed but not documented in 2002 or 2003.

PELT TAGGING RECORDS

KDWP initiated a pelt tagging program in 1994 to acquire more precise information on swift fox distribution and harvest than had been achieved through the annual Furbearer Harvest Survey. Any swift fox taken in Kansas must be presented to KDWP for tagging within seven days of the close of the season. Numbers of swift fox presented annually to KDWP for pelt tagging since the tagging program was initiated are presented in Figure 1.

In 2003-04, 178 swift fox were taken by 20 fur-harvesters in Kansas (Figure 1); these swift fox were taken from 7 Kansas counties. The total number of swift fox taken in each county between the 1994-95 and 2001-02 fur-harvesting seasons is presented in Figure 2. The annual 2003-04 season bag per fur-harvester is provided in Table 1. Table 2 provides a breakdown of the methods used to take swift fox during the 2003-04 furbearer season, and Table 3 shows the primary species being pursued at the time swift fox were taken. Habitat types from which swift fox were taken during the 1994-95 through the 2001-02 furbearer seasons are presented in Table 4.

Both coyote and swift fox pelt prices have increased in the past few seasons, and there seems to be a growing interest in swift fox as taxidermy specimens. Swift fox harvest has subsequently increased over the past 2 seasons. Between 1994 and 2001, 181 swift fox were

tagged by KDWP (Figure 3); in 2003 alone, 178 swift fox were tagged (Figure 1, Tables 1-3). Additionally, of 101 swift fox taken between 1995 and 2001, only 10 were harvested by fur-harvesters who indicated they were pursuing swift fox as the primary target species at the time of take (Table 3); in 2002 and 2003, 58% (n = 50) and 49% (n = 88), respectively, of the of the swift fox harvest was by individuals primarily pursuing swift fox. Despite these increased harvest pressures, harvest levels are still well below past harvest estimates from annual Furbearer Harvest Surveys.

Table 1. Total bag of swift fox by individual fur-harvesters during the 2003-04 furbearer season in Kansas.

Season bag per fur-harvester	Number (%) of fur-harvesters	Cumulative percent of fur-harvesters	Total number (%) of swift fox taken	Cumulative percent of swift fox taken
1	7 (35%)	35%	7 (3.9%)	3.9%
2	2 (10%)	45%	4 (2.3%)	6.2%
3	2 (10%)	55%	6 (3.4%)	9.6%
4	1 (5%)	60%	4 (2.2%)	11.8%
5	1 (5%)	65%	5 (2.8%)	14.6%
6	1 (5%)	70%	6 (3.4%)	18.0%
8	2 (10%)	80%	16 (9.0%)	27.0%
11	1 (5%)	85%	11 (6.2%)	33.1%
30	1 (5%)	90%	30 (16.8%)	50.0%
36	1 (5%)	95%	36 (20.2%)	70.2%
53	1 (5%)	100%	53 (29.8%)	100.0%
	20		178	

Table 2. Methods used to take swift fox during the 2003-04 furbearer season in Kansas.

Method of take	Number of swift fox	Percent of swift fox
Foothold trap	108	60.7%
Conibear trap	19	10.7%
Snare	1	0.6%
Rifle	6	3.4%
Cage	41	23.0%
Salvage	3	1.7%
Total	**178**	**100.0%**

Table 3. Primary species being pursued when swift fox were taken during the 2003-04 furbearer season in Kansas.

Target species being pursued	Number of swift fox taken	Percent of swift fox taken
Swift fox	88	49.4%
Coyote	75	42.1%
Badger	10	5.6%
Prairie dog	1	0.6%
Bobcat	1	0.6%
Salvage	3	1.7%
Total	**178**	**100.0%**

Table 4. Habitat types from which swift fox were taken during the 1994-95 through 2001-02 furbearer seasons in Kansas.

Immediate Habitat[1] / General Habitat[2]	Number of Swift Fox Harvested	Percent of Total Harvest
Short-grass prairie		
Short-grass prairie	91	51.1
Dryland crop	3	1.7
Total	**94**	**52.8**
Dryland crop		
Short-grass prairie	7	3.9
Dryland crop	73	41.0
Total	**80**	**44.9**
Irrigated crop		
Irrigated crop	2	1.1
Total	**2**	**1.1**
CRP		
CRP	1	0.6
Total	**1**	**0.6**
Other (Homestead)		
Dryland crop	1	0.6
Total	**1**	**0.6**
Total	**178**	**100**

[1] Immediate habitat type is that from which the swift fox was taken
[2] General habitat type is the predominant habitat within 2 miles of the harvest site

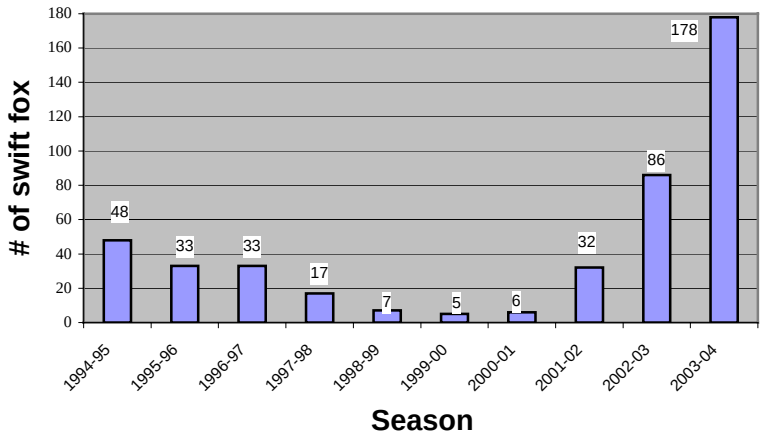


Figure 1. Number of swift fox tagged by KDWP during the 1994-95 through 2001-02 furbearer seasons in Kansas.

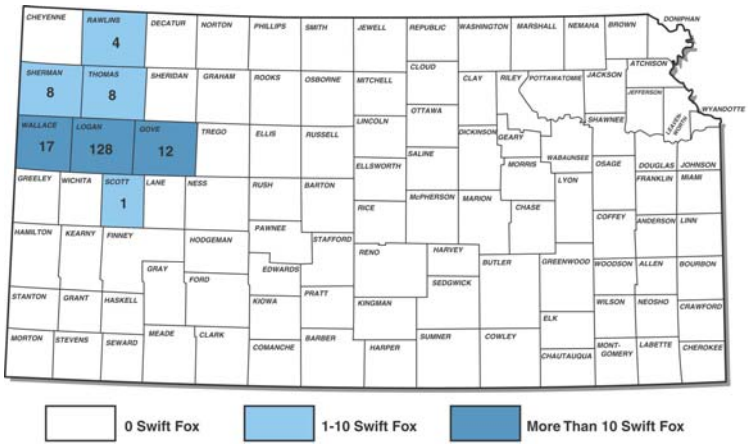


Figure 2. Number of swift fox harvested per county as reported for pelt tagging purposes in Kansas from the 1994-95 to 2001-02 furharvesting seasons.

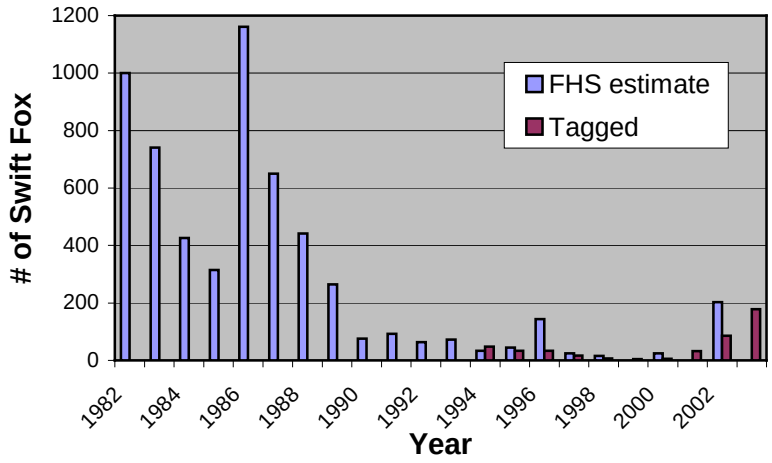


Figure 3. Number of swift fox pelt tagged annually by KDWP since a tagging program was initiated in 1994, and swift fox harvest estimates from the annual Furbearer Harvest Survey (FHS) since a harvest season was initiated in 1982.

SWIFT FOX INVESTIGATIONS IN OKLAHOMA, 2003

Julianne Whitaker Hoagland, Oklahoma Department of Wildlife Conservation, 1801 N. Lincoln Blvd., Oklahoma City, OK 73105; 405-522-0189; FAX 405-521-6535; e-mail jhoagland@odwc.state.ok.us

ABSTRACT

Baseline swift fox (*Vulpes velox*) distribution data were collected over a 3-year period, 1998 - 2000, by using a track search surveys. Habitat associated with track locations was examined in 2001-02. Results of these investigations have been reported in previous Swift Fox Conservation Team Annual Reports. Historic plat maps and 1995 digital orthophotos were digitized based on vegetation classification developed by Hoagland (2000) in 2002-03, by the University of Oklahoma's Department of Geography, as part of an overall shortgrass High Plains species of greatest conservation need habitat assessment project. Also, Oklahoma State University began a study in 2003 to look at abundance and habitat associations of the swift fox in the Oklahoma panhandle. These studies are currently underway and results are not yet available.

INTRODUCTION

In Oklahoma, the swift fox is designated as a species of greatest conservation need. Historically, the swift fox was believed to occur throughout the shortgrass High Plains region of Oklahoma, including all or portions of Cimarron, Texas, Beaver, Harper, Woodward and Ellis counties (Duck and Fletcher 1945, Caire et al. 1989, Hoagland 2002a). Swift foxes were observed in Texas and Beaver counties during the 1950s and 1960s by several researchers (Cutter 1959, Glass 1959, Kilgore 1969). A survey of landowners in 1988 conducted by the Oklahoma Department of Wildlife Conservation (ODWC) produced 21 swift fox sightings and 8 den locations in the panhandle region (Kocka 1989). Additionally, five verified swift fox sightings by ODWC biologists were reported from Cimarron, Texas, Beaver and Roger Mills counties (Hoagland 1996) between 1988 and 1994. Optimal swift fox habitat (shortgrass prairie with relatively level terrain) occurs primarily in the western 2/3 of the Oklahoma panhandle. Increasing topography and taller, denser mixed grass vegetation replaces the blue gramma/buffalo shortgrass community as one moves west to east across the swift fox's range in Oklahoma.

SUMMARY OF PROGRESS

By using a systematic track search survey, a baseline distribution for swift fox was conducted in the panhandle and northwestern Oklahoma, between 1998 and 2000. The objectives of this project were to establish a track search survey in order to develop baseline swift fox distribution and abundance information throughout the shortgrass High Plains region in Oklahoma and develop a technique that could be used to monitor population trends of swift fox over time. The survey was conducted in portions of 6 counties (Cimarron, Texas, Beaver,

Harper, Ellis, and Woodward) in order to investigate the species' current distribution within its historical range. Tracks were found in 35 of the 57 townships surveyed in 1998, 43 of 114 townships surveyed in 1999, and in 36 of 101 townships surveyed in 2000. All townships where swift fox tracks were successfully detected were in the panhandle region. Hoagland (2002b) presented detailed results of the survey.

Preliminary swift fox habitat analysis was completed during 2002. Swift fox track locations, generated from the track survey, were used to determine the habitat associated with swift fox distribution across the shortgrass High Plains of Oklahoma. To further examine the habitat associated with the swift fox track location point data, US Geological Survey (USGS) Land Use and Land Cover (LULC) categories (United States Geological Survey 1990) were measured within a 3-km radius circle drawn around the swift fox track points - the 95% minimum convex polygon home range size for a family of swift fox plus a buffer of ½ the radius (Marsha Sovada, United States Geological Survey Biological Resources Division, Personal Communication). All lands classified as cropland or tame pasture were examined in the field to determine distribution of Conservation Reserve Program (CRP) fields.

Swift fox tracks were encountered more often in the herbaceous rangeland LULC type than in other land use and land cover categories. Herbaceous rangeland, however, was the land cover type searched whenever it was available within a survey township. Swift fox tracks were observed 59% of the time in the rangeland type in 1998, 68% in 1999, and 74% in 2000. Swift fox tracks were observed in agricultural areas throughout the study area, but agricultural areas were not searched in proportion to their availability.

Herbaceous range also comprised at least one half of the 3-km radius circles drawn around the track locations for all 3 years (range 50.8% to 59.6%), while croplands (including CRP lands) made up anywhere from 37.7% to 44.9% of the circles. The proportion of the cropland that was comprised of CRP lands increased each year over the 3 years surveyed (32.5% to 44.6 %). Nearly half of the panhandle region, where all track locations were recorded over the 3 years, was comprised of cropland and the other half rangeland, with the 92.2% of that rangeland existing as herbaceous range. This is just slightly different from the proportion of the LULC classifications found within the 3-km radius circles of the track locations. Herbaceous range may be slightly higher in the 3-km radius circles when compared to the availability because rangeland was surveyed for tracks when it was available.

Other related habitat assessment activities completed in 2003 included habitat inventories and a landscape analysis of suitable habitat for high priority species in the shortgrass High Plains, conducted by the University of Oklahoma (OU) Department of Geography (Hoagland, 2003). For historical comparison, the 1870 and 1890 General land Office Survey plat maps were digitized into ArcInfo coverages: fence; hydrology point, line and polygon features; roads; settlement point and polygon features; and vegetation. The digitizing of existing landscapes was completed by OU for the 3 panhandle counties by examining 1995 digital orthophoto quarter quads (DOQQs) and computer mapping the landscape components using Hoagland (2000). Further habitat analyses and evaluations are currently underway to determine habitat

characteristics at the landscape level that are necessary to support swift fox in the shortgrass High Plains of Oklahoma.

A new project, directed by Oklahoma State University (OSU) under a Wildlife Conservation and Restoration Program (WCRP) grant, was initiated in 2003 to look at abundance and habitat associations of the swift fox in Oklahoma. Objectives of the OSU study are to: estimate density of swift foxes throughout the Oklahoma Panhandle; develop quantitative relationships between density estimates and indices of relative abundance; and assess habitat suitability for swift fox by linking density estimates and survey results to landscape and habitat characteristics with GIS analyses. Field work began during the summer 2003 and will continue for through December 2004.

LITERATURE CITED

Caire, W., J. D. Tyler, B. P. Glass, and M. A. Mares. 1989. Mammals of Oklahoma. University of Oklahoma Press, Norman, Oklahoma.

Cutter, W. J. 1959. Notes on some mammals from north Texas. Southwestern Naturalist 4:30-34.

Duck, L. G. and J. B. Fletcher. 1945. A survey of the game and furbearing animals of Oklahoma. Divison of Wildlife Restoration and Resources, Oklahoma Game and Fish Commission, Pitman-Robertson Serial No. 2, State Bulletin No. 3. Oklahoma City.

Glass, B. P. 1959. Status of the kit fox, *Vulpes velox*, in the High Plains. Proceedings of Oklahoma Academic Science 37:162-163.

Hoagland, B. 2000. The vegetation of Oklahoma: A classification for landscape mapping and conservation planning. The Southwestern Naturalist 45(4):385-420.

Hoagland, J. W. 1996. Oklahoma swift fox status report - 1996. Pages 30-49 *in* Luce, B. and F. Lindzey, editors. Annual Report of the Swift Fox Conservation Team. Wyoming Game and Fish Department, Cheyenne, Wyoming.

_____. 2002a. Population distribution of swift fox in northwestern Oklahoma using a track search survey. Final Report. Oklahoma Department of Wildlife Conservation. Federal Aid Project E-49. Oklahoma City.

_____. 2002b. Population distribution of swift fox in northwestern Oklahoma using a track search survey. Pages 80-91 *in* Peek, M., editor. Annual Report of the Swift Fox Conservation Team. Kansas Department of Wildlife and Parks, Emporia, Kansas.

_____. 2003. Development and Implementation of Short and Mixed Grasslands Species Management Plans. Annual Performance Report. Oklahoma Department of Wildlife Conservation Federal Aid Project R-3-R. Oklahoma City.

Kilgore, D. L., Jr. 1969. An ecological study of the swift fox *(Vulpes velox*) in the Oklahoma Panhandle. American Midland Naturalist 81:512-534.

Kocka, D. M. 1989. Furbearer distribution and population trends. Oklahoma Department Wildlife Conservation Performance Report W-82-R-28, Study 3, Job 1. 6 pp.

United States Geological Survey. 1990. Land Use and Land cover digital data from 1:250,000 and 1:100,000 scale maps. National Mapping program, Technical Instructions Data Users Guide 4.

MONITORING POPULATION STATUS OF SWIFT FOX IN MONTANA

BRIAN GIDDINGS, Montana Department of Fish, Wildlife and Parks, P.O. Box 200701, Helena, MT 59620-0701 (phone: 406-444-0042; fax: 406-444-4952; e-mail: bgiddings@state.mt.us)

RYAN RAUSCHER, Montana Department of Fish, Wildlife and Parks, Route 1 – 4210, Glasgow, MT 59230 (phone: 406-228-3725; fax: 406-2288161; e-mail: rrauscher@state.mt.us)

ABSTRACT

Population monitoring during the 2003 report period involved collection of swift fox observation reports and surrendered specimens that were the result of incidental captures during coyote trapping activities. These site-specific location data were compiled and entered into the Montana Fish, Wildlife and Parks (FWP) swift fox species distribution database. Licensed trappers in northcentral Montana were surveyed for their opinion regarding the population trend of swift fox in their area. Montana's state working group was inactive during 2003 although future planning activities are expected to meet the national Swift Fox Conservation Team (SFCT) conservation strategy objectives (Kahn et al. 1997).

INTRODUCTION

Montana has provided annual program activity summaries related to accomplishing conservation strategies as outlined in the Conservation Assessment and Conservation Strategy of Swift Fox in the United States (CACS) (Kahn et al. 1997) since 1994 (Giddings and Knowles 1995, Giddings 1996, Zimmerman and Giddings 1997, Giddings 1998, Giddings 1999, Giddings 2000, Giddings 2001, Giddings 2002). Management direction to date has been to determine both species distribution and relative population size for swift fox in the state, which will now serve as baseline data to measure changes during future monitoring and survey activities. The Montana state working group will proceed to make an assessment of suitable habitat (occupied and unoccupied) to focus land management planning efforts for swift fox and attempt to designate habitat corridors to encourage natural dispersal in an effort to connect northern populations to the larger contiguous continental swift fox population.

METHODS

Observation reports were collected from resident trappers, agency biologists and the public within the state, particularly from areas in northcentral Montana, in an effort to monitor changing swift fox distribution and population status. This site-specific location information was added to the existing Montana Fish, Wildlife and Parks (FWP) swift fox

distribution database to continue building a composite map with GIS-generated land ownership and cover type layers. Carcasses of reported incidentally taken swift fox were also collected from resident coyote trappers and location data entered into the species database. All trappers in northcentral and northeast Montana who purchased a general trapper's license in 2003 (n = 132) were surveyed regarding swift fox status and management through a mailed questionnaire.

RESULTS

Four observation reports with legal descriptions, and 2 carcasses that were surrendered to FWP were added to the FWP swift fox database during the 2003 report period. These reports originated primarily from northcentral Montana counties with a single sighting from the southeastern portion of the state in Custer County. Two observations were reported south of US Highway 2 in Valley County which provided new and additional evidence that species distribution is expanding southward. The response rate to the trapper mail questionnaire regarding swift fox status was 47%(n = 62) of which 6 respondents indicated they had swift fox present along their trapline; the majority of respondents (n = 5) believed that the swift fox population had increased during the past 3 years.

DISCUSSION

Management objectives listed in the Conservation Assessment and Conservation Strategy for Swift Fox in the United States (Kahn et al. 1997) are: 1) to maintain local self-sustaining populations which are geographically distributed throughout each state; and 2) that populations occupy a minimum of 50 percent of the suitable habitat that is available. A self-sustaining swift fox population is now established in northcentral Montana that is contiguous with adjacent Canadian populations, while another swift fox population has been reintroduced and is now established on the Blackfeet Reservation (M. Johnson, pers comm.). Montana FWP survey information also indicates that animals occupy southeastern Montana in areas adjacent to northeastern Wyoming. Presently there are 22 counties in Montana with various amounts of suitable prairie habitat while current species distribution records (1992-2004) indicate that swift fox may occupy 16 of the 22 counties.

Population census data (Moehrenschlager and Moehrenschlager 2001) and more recent swift fox occurrence reports suggest that a minimum population size of 200-300 foxes are now present in northcentral Montana, which is part of a larger contiguous population in southern Canada, and together these now comprise 800-1,000 total animals. While swift fox in Montana become more widely distributed and the population continues to increase in numbers, the incidental take by trappers and other human causes of mortality may be occurring more frequently.

Observations of swift fox in northcentral Montana have increased since 2001 and continue to provide evidence of an expanding species distribution. Both statewide distribution survey results and recent observation reports document swift fox presence further south (south of U.S Highway 2) and west of their previously known distribution. A survey of 62 trappers in northcentral Montana indicates that of trappers who have swift fox along their trapline, the majority (83%) believes the swift fox population has increased in the past three years. Further, the numbers of road-killed swift fox and incidentally trapped animals have both increased. In each of the past 2 years, at least one swift fox has been surrendered to MFWP personnel that could not be released uninjured. During the 2003-04 trapping season, MFWP is aware of 4 swift fox captured in foothold traps that were released uninjured in Trapping District 6 (northcentral Montana), despite trapper efforts to avoid captures. As this survey is only a sample of the licensed furbearer trappers in Trapping District 6 (TD6), these numbers probably underestimate the frequency of incidental swift fox captures.

Over the past several years, representatives of the Montana Trapper's Association (MTA) have suggested that MFWP consider opening a restricted swift fox season in northcentral Montana. All trappers in TD6 who purchased a general trapping license in 2003 (n = 132) were surveyed by mail for their opinion on allowing a limited swift fox harvest. Of the respondents (n = 62), the majority (68%) favor opening a limited swift fox season. Montana's resident trappers have generally been very supportive of swift fox conservation and management efforts while providing direct assistance to FWP biologists and swift fox researchers over the past decade.

A limited legal harvest could allow trappers the opportunity to retain pelt possession of this relatively unique fox and provide the state's residents with a new harvest opportunity. The annual sample of swift fox could allow MFWP to monitor species distribution and status through harvest under mandatory tagging/registration and carcass collection that could provide biological information such as genetic analysis, sex ratio, age structure, disease profiles, and reproductive rates. Over the past 10-15 years coyote trappers have attempted to avoid capturing swift fox by using pan tension adjustments, although several swift fox are captured annually with some being released uninjured and others being dispatched and surrendered to MFWP personnel. Swift fox seasons have not been shown to be detrimental to swift fox populations or species distribution in other states and maintaining harvest pressure on coyotes and red foxes in northcentral Montana will be beneficial to the long-term trend in the state's swift fox population. Of the 10 states involved with swift fox conservation, Kansas, Texas, and New Mexico allows swift fox harvest and Wyoming permits limited incidental take.

In Montana, relatively large tracts of native prairie habitat exist today (reclaimed after homesteads were abandoned in 1930s) that are now protected through federal and state ownership, private land conservation easements, landowner incentive programs, etc, and there is an increasing awareness and appreciation for the value of conserving prairie habitats. The decline in swift fox numbers during the 20th century was attributed to a high vulnerability to poison baits for coyote and wolf control, high susceptibility to unregulated trapping, habitat loss, and increased competition from expanding fox and

coyote populations. Several of the factors that lead to the decline in swift fox numbers no longer present a significant threat: poison baits are strictly regulated and used much less frequently, unregulated take has not been allowed since 1979, and fox and coyote populations have stabilized relative to the early 1900's. Continuing to reduce or control coyote populations through harvest is an important component to the management of an expanding swift fox population in the state, although overlap of the two species will continue to result in some incidental capture of individual swift fox.

A second international census of the Canada and Montana swift fox populations is tentatively scheduled for the winter of 2005-06. MFWP intends to participate again in this census, which will provide an updated estimate of the Montana population and perhaps allow for a biological assessment of a limited swift fox harvest season in a portion of northcentral Montana.

LITERATURE CITED

Giddings, B. 2002. Management activities for swift fox in Montana. Pages 10-13 *in* Grenier, M., ed. 2003. Swift fox conservation team 2002 annual report. Wyoming Game & Fish Dept., Lander, WY. 73 pp.

_____. 2001. Montana swift fox management activities, 2001-2002. Pages 48-52 *in* Peek, M., ed. Swift fox conservation team annual report. Kansas Dept. of Wildlife & Parks, Emporia, KS. 120 pp.

_____. 2000. Montana swift fox management activities. Pages 40-44 *in* Schmitt, C. G. and B. Oakleaf, eds. Swift fox conservation team annual report. New Mexico Dept. of Game & Fish, Santa Fe, NM. 1032 pp.

_____. 1999. Montana swift fox management activities. Pages 191-201 *in* Schmitt, C.G., ed. 1999 Swift Fox Conservation Team Annual Report. New Mexico Dept. Game & Fish. Santa Fe, New Mexico. 201 pp.

_____. 1998. Swift fox management activities in Montana. Pages 18-22 *in* Roy, C.C., ed. 1998. Swift Fox Conservation Team Annual Report. Kansas Dept. Wildlife & Parks. Emporia, KS. 107 pp.

_____. 1996. Distribution and investigations of swift fox in Montana. Pages 25-29 *in* Luce, B. and F. Lindzey, eds. Annual report of the swift fox conservation team 1996. Wyoming Game and Fish Dept., Lander, WY. 110 pp.

_____ and C. Knowles. 1995. The current status of swift fox in Montana. Pages 101-120 *in* Allen, S.H., J. Whitaker Hoagland, and E. Dowd Stukel, eds. Report of the swift fox conservation team 1995. ND Game and Fish Dept., Bismark, ND. 170 pp.

Kahn, R., L. Fox, P. Horner, B. Giddings, and C. Roy. 1997. Conservation assessment and conservation strategy for swift fox in the United States. Montana Fish, Wildlife & Parks. Helena, MT. 54 pp.

Moehrenschlager, A. and C. Moehrenschlager. 2001. Census of swift fox (*Vulpes velox*) in Canada and northern Montana: 2000-2001. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 24. Edmonton, AB. 21 pp.

Zimmerman, A. L. and Giddings, B. 1997. Preliminary findings of swift fox studies in Montana. Pages 27-44 *in* Giddings, B., ed. Swift fox conservation team annual report. Fish, Wildlife and Parks, Helena, MT. 125 p.

NEBRASKA SWIFT FOX REPORT 2003

RICHARD BISCHOF, Nebraska Game and Parks Commission, 2200 North 33rd St., Lincoln, NE 68503 (email: rbischof@ngpc.state.ne.us)

SUMMARY OF SURVEY ACTIVITIES

We conducted the 2003 Nebraska swift fox survey (using the scent station methodology) in April and May 2003. Scent stations were created by sifting a mixture of fine sand and glycerin in a circular pattern (~ 0.75m) near gravel and dirt roads. A plaster tablet soaked in a cod-liver/salmon oil mix was placed in the center of each station. Five scent stations were placed in each township surveyed and, weather permitting, were re-set for 3 consecutive days or until at least one station in a township showed sign of swift fox visitation (i.e., tracks, feces). Scent stations within an individual county were arranged along transects that were 1.6 km apart (when and where possible). Station locations were selected based on the suitability of surrounding habitat and the presence of certain structures (e.g., fence rows, gates, intersections, etc.) that facilitate animal movement. We survey 34 townships in six different counties (Sioux, Dawes, Sheridan, Box Butte, Scottsbluff, Cherry), for a total of 360 scent station nights. Because of frequent rain showers, several townships could not be surveyed for 3 consecutive days; some townships were surveyed for only a single night.

The planned geographic scope of the survey was not accomplished in 2003 because of adverse weather conditions and other logistical problems. However, we found swift fox sign in 5 townships in 3 different counties (Sioux, Dawes, Box Butte), including in one township (located in Sioux County) for which there were no previous records of swift fox occurrence.

2003 NEW MEXICO SWIFT FOX COMPLETION REPORT

TERRY ENK, New Mexico Department of Game and Fish, PO Box 25112, Santa Fe, NM 87504

ANNUAL UPDATE

The New Mexico Department of Game and Fish (NMDGF) conducted swift fox surveys along 99 roadway transects in the spring of 2003. Scat surveys were conducted following the protocol developed by R. Harrison along each of the 10-mile transects throughout swift fox range in eastern New Mexico. Surveys were conducted by 4 NMDGF biologists, and required a total of 27 days to complete. A total of 505 potential swift fox scats were collected and submitted to Dr. J. Dragoo at the University of New Mexico for genetic analysis. The results of these analyses will be completed in spring 2004.

DISTRIBUTION

The distribution paper written by Harrison and Schmitt (2003) remains the definitive description of swift fox distribution in New Mexico. We have no additional or new information regarding swift fox distribution in the State.

COST

Total cost for swift fox work in 2003, including surveys, genetic analysis of scats, and other activities associated with swift fox was approximately $22,615. Of this, 75% was federal and 25% was state. All state funds had a federal match.

LITERATURE CITED

Harrison, R. L. and C. G. Schmitt. 2003. Current swift fox distribution and habitat selection within areas of historical occurrence in New Mexico. Pages 71-77 in M.A. Sovada and L. N. Carbyn, editors. Ecology and conservation of swift foxes in a changing world. Canadian Plains Research Center, Regina, Saskatchewan.

DETECTION OF SWIFT FOX (*Vulpes velox)* IN FURBEARER SURVEYS IN FALL RIVER COUNTY, SOUTH DAKOTA

ZACH H. OLSON, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007

JONATHAN A. JENKS, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007

EILEEN DOWD STUKEL, South Dakota Department of Game, Fish, and Parks, 523 East Capitol, Pierre, SD 57501

ABSTRACT

Surveys were conducted on public (Buffalo Gap National Grassland) and private lands in Fall River County, South Dakota, from 22 May – 24 August 2002. Two survey methods were used: 1) surfaces capable of holding furbearer sign were examined for tracks and continuous visual searches were conducted to locate dens and active furbearers; and 2) scent stations were established along transects using the Hetlet (1994) method. The 2 methods were used concurrently where possible. Total area surveyed was 151.5-km² (58.5-mi²); 111.4-km² (43-mi²) of public lands and 40.1-km² (15.5-mi²) of private lands. Trackable surfaces and scent station surveys were conducted simultaneously on 90.7-km² (35 mi²) of public lands. An additional 20.7-km² (8-mi²) of adjacent public lands were surveyed with the trackable surfaces method only. Both survey methods were used on 20.7-km² (8-mi²) of private lands. Trackable surfaces surveys were conducted on an additional 19.4-km² (7.5-mi²) of private lands. A total of 101 tracks, dens, and visual sightings were recorded during the trackable surfaces survey, including 4 swift fox tracks and 2 inactive dens. A total of 616 scent stations readings was recorded; 408 stations had no tracks while 68 (11%) striped skunk, 32 (5.2%) coyote, 16 (2.6%) swift fox, and 3 (<1%) small mustelid tracks were documented. Trackable surfaces surveys revealed 3 swift fox tracks in the area where scent stations surveys revealed 16 swift fox tracks. Less than 14.2-km² (5.5-mi²) of areas surveyed showed evidence of swift fox.

INTRODUCTION

The swift fox (*Vulpes velox*) ranged historically from the Texas panhandle, north through the prairie/mountain states, and up into the Canadian prairie provinces (Scott-Brown et al. 1987). Many reasons have been suggested for their population decline including loss of native prairie habitat, unregulated trapping and hunting, and predator control (Kahn et al. 1997). Sovada et al. (1998) reported that predation and poisoning were the major causes for swift fox mortality in western Kansas. Currently, the swift fox is listed as a state threatened species in South Dakota (South Dakota Wildlife Diversity

Homepage, http://www.state.sd.us/gfp/Diversity/TES.htm). We conducted surveys on public and private lands to determine the relative occurrence of swift fox and other furbearers in Fall River County, South Dakota in a continuing attempt to better understand the reasons for the species' limited distribution in the state.

STUDY AREA

Public (Buffalo Gap National Grassland) and private lands were surveyed in Fall River County, which is located in the extreme southwestern corner of South Dakota. Topography in this region is gently rolling to undulating hills. Vegetation is dominated by short to mid-grass prairie. The climate is characteristically hot in the summer and cool in the winter (Hillman and Sharps 1978).

METHODS

Two survey methods were used to document swift fox, American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), cottontails (*Sylvilagus* spp.), coyote (*Canis latrans*), common raccoon (*Procyon lotor*), small mustelids (*Mustela* spp.), and striped skunk (*Mephitis mephitis*) occurrence in the study area. Survey methods were conducted simultaneously where possible.

Trackable surfaces surveys were conducted to document any furbearer sign by species. A Magellan GPS 320 (Magellan Systems Corp., San Dimas, CA) Global Positioning System (GPS) was used to document Universal Transverse Mercator (UTM) readings at each track. A brief description of the surroundings also was recorded. Previously, Peterson et al. (1999) conducted similar surveys in the study area. Surfaces were deemed "trackable" if they could have been reasonably expected to hold a furbearer print. Common trackable surfaces included edges of stock ponds, creek bottoms, cow paths, and two-track roads (Mason and Hetlet 1992). Dens and visual sightings of furbearers also were documented during searches of ridge-tops, sides of hills, and gullies.

Scent station surveys were conducted according to the Hetlet method (Mason and Hetlet 1992, Hetlet 1994, Hetlet 1995, and L.A. Hetlet, United States Department of Agriculture Forest Service, Personal Communication). This method involves sifting a 30.5-cm (12-in) diameter circle of oil/sand mixture approximately 1-cm deep onto the ground and baiting it with 2-oz of Chicken of the Sea® Jack Mackerel. The scent station circle was cleared of vegetation before sand-sifting with a Polanski firefighting tool. The ratio of oil to window-screen-sifted sand was approximately 0.25-L (1-cup) vegetable oil per 3.8-L (1-gal) of sand. Dry sand was preferred as wet sand would not adhere to the oil. The base of a 35.6-cm (14-in) flower pot with the bottom removed to a 30.5-cm (12-in) diameter was used as a form for sifting to standardize scent station size. In addition, scent stations were standardized to approximately 0.75-L (3-cups) of the oil/sand mixture per station.

Surveyed areas were chosen on the basis of previous swift fox sightings and with respect to swift fox habitat preferences (L.A. Hetlet, United States Forest Service, Personal Communication, Hoagland 1997). Scent stations were placed on transects 0.4 km (0.25 mi) apart on ridge-tops and two tracks, measured by vehicle odometer, resulting in approximately 4 scent stations per section of land. Scent stations were pin-flagged approximately 5-m from the station to minimize missed stations. Stations were baited in late afternoon or evening to limit insect consumption and desiccation due to sun and wind. Stations were checked the following morning to ensure maximum track freshness and ease of reading. Transects were maintained for 3 consecutive nights if possible, or 3 out of 5 nights if weather prevented baiting or reading. Tracks found were recorded by species.

RESULTS AND DISCUSSION

A total of 151.5-km² (58.5-mi²) was surveyed. Trackable surfaces and scent station surveys were conducted simultaneously on 90.65-km² (35-mi²) of public (Buffalo Gap National Grassland) lands. An additional 20.7-km² (8 mi²) of adjacent public lands were surveyed with the trackable surfaces method. Both survey methods were used on 20.7-km² (8-mi²) of private lands. Trackable surfaces surveys were conducted on an additional 19.4 km² (7.5-mi²) of private lands.

A total of 616 scent stations readings was recorded; 408 stations had no tracks while 68 striped skunk, 32 coyote, 16 swift fox, and 3 small mustelid tracks were documented. In addition, 1 jackrabbit, and 1 cottontail track also were documented. A total of 87 scent station visits were from non-target species (e.g., cattle, small rodents). A total of 101 tracks, dens, and visual sightings were recorded during trackable surfaces surveys including 51 coyote, 21 striped skunk, 18 raccoon, 5 swift fox, 2 badger, 1 cottontail rabbit, and 2 unknown tracks. Based on location of tracks recorded, less than 14.2-km² (5.5-mi²) of the areas surveyed showed evidence of swift fox. This land area is slightly larger than the 11-km² (4.25-mi²) Peterson et al. (1999) described as containing swift fox sign. All swift fox sign was documented in areas where swift fox had been previously documented (Hetlet 1994, Hetlet 1995, and L.A. Hetlet, United States Department of Agriculture Forest Service, Personal Communication).

Trackable surfaces surveys documented 3 swift fox tracks in the same area that scent station surveys documented 16 swift fox tracks. Scent stations not only accumulated more swift fox tracks but also included an established time interval within which tracks were documented. As the summer of 2002 was unusually dry, tracks observed in trackable surfaces surveys, such as around stock ponds, could have been made weeks, or potentially months prior to surveys. Quality of a track in dried mud was incomparable to that of a track left in the oil/sand mixture of scent station surveys. Lack of rainfall significantly decreased the amount of trackable surfaces available. Also, the unusually dry conditions were prohibitive with respect to scent station surveys as most private landowners, not wanting to risk a vehicle-started fire, would only allow foot traffic on their lands. Scent station surveys were not attempted on foot as carrying oiled

sand on surveys was deemed inefficient. In such cases, only trackable surfaces surveys were completed.

Scent station surveys proved to be far more efficient than trackable surfaces surveys at producing tracks over the entire course of this study, with the added benefit of timing of track deposition. Trackable surfaces surveys were valuable in detecting furbearers not attracted to the scent stations, but only if there was recent precipitation to facilitate tracking. Therefore, we suggest the Hetlet method of scent station surveys to detect swift fox supplemented with trackable surfaces surveys when the weather permits.

LITERATURE CITED

Hetlet, L. A. 1994. Directions for the annual swift fox survey routes. U.S. Forest Service, Fall River Ranger District, Hot Springs, South Dakota, USA.

_____. 1995. 1995 Swift fox survey. U.S. Forest Service, Fall River Ranger District, Hot Springs, South Dakota, USA.

Hillman, C. N. and J. C. Sharps. 1978. Return of Swift Fox to Northern Great Plains. Proceedings of the South Dakota Academy of Science 57:154-162.

Hoagland, J. W. 1997. A review of literature related to swift fox habitat use. Pages 113-125 *in* B. Giddings (ed.), 1997 Swift Fox Conservation Team Annual Report. Montana Department of Fish, Wildlife and Parks, Helena**.**

Kahn, R., L. Fox, P. Horner, B. Giddings, and C. Roy. 1997. Conservation assessment and conservation strategy for swift fox in the United States. Swift Fox Conservation Team. Colorado Division of Wildlife, Denver.

Mason, G. and L. Hetlet. 1992. Recommendations for conducting swift fox surveys. U.S. Forest Service, Chadron, Nebraska, USA.

Peterson, R. A., J. A. Jenks, and E. Dowd Stukel. 1999. Survey of Furbearers in Fall River County South Dakota with Emphasis on Swift Fox (*Vulpes velox*). Pages 59-65 *in* C.G. Schmitt (eds.), 1999 Swift Fox Conservation Team Annual Report, New Mexico Game and Fish Department, Santa Fe.

Scott-Brown, J. M., S. Herrero, and J. Reynolds. 1987. Swift fox. Pages 433-441 *in* M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Toronto, Ontario.

Sovada, M. A., C. C. Roy, J. B. Bright, and J. R. Gillis. 1998. Causes and Rates of Mortality of Swift Foxes in Western Kansas. Journal of Wildlife Management 62(4):1300-1306.

2003 ANNUAL REPORT: STATUS OF SWIFT FOX IN TEXAS

HEATHER A. WHITLAW, Wildlife Diversity/Endangered Resources Biologist, Texas Parks and Wildlife Department, Box 42125, Texas Tech University, Lubbock, TX 79409-2125; heather.whitlaw@tpwd.state.tx.us

CURRENT PROJECTS

Results of current research are presented below as verbatim copies of Abstracts presented at the 39th Annual Meeting of the Texas Chapter of the Wildlife Society (19-21 February 2004, Kerrville TX). Permission to reproduce these abstracts in their entirety was received from Dr. Warren Ballard (Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX; warren.ballard@ttu.edu).

IMPORTANCE OF ARTIFICIAL ESCAPE COVER FOR INCREASING SWIFT FOX POPULATIONS IN NORTHWEST TEXAS

BRADY K. MCGEE, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

WARREN B. BALLRD, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

KERRY NICHOLSON, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

Currently, coyotes are thought to be the primary mortality factor of swift fox. Research has suggested that swift fox survival is reduced in areas with high coyote abundance. Because swift fox use dens year-round for protection from predators, we hypothesize that lack of den sites and escape cover may limit swift fox populations in northwest Texas. In order to test our hypothesis, artificial escape dens were installed at a private ranch (PR) in Sherman County, and on the Rita Blanca National Grasslands (NG) in Dallam County, Texas. From 01 January to 31 December 2002, we capture and radio-collared 46 swift fox in 1,187 trap-nights. Scat transects revealed higher coyote abundance on NG (3.22 scats/transect) than on PR (0.11 scats/transect). On NG, annual swift fox survival in artificial escape den treatment areas was 0.88, but in untreated areas survival was 0.38. On PR where coyote abundance was low, annual swift fox survival was 0.89 in untreated areas and 0.88 in treatment areas. We also found that swift fox in treatment areas had higher recruitment (2.8 young/adult) than in untreated areas (1.9 young/adult) for both study sites combined. Results from the first year of the study have supported our hypothesis. In areas with high coyote abundance, artificial escape dens

have helped increase swift fox survival, but in areas with few coyotes, artificial dens have had little effect.

SWIFT FOX (*VULPES VELOX*) OCCURRENCE IN BLACK-TAILED PRAIRIE DOG (CYNOMYS LUDOVICIANUS) TOWNS IN THE NORTHWESTERN PANHANDLE OF TEXAS

KERRY NICHOLSON, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

WARREN B. BALLRD, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

BRADY K. MCGEE, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

Black-tailed prairie dog (*Cynomys ludovicianus*) colonies provide a unique habitat that influences the abundance and species composition of birds, small mammals, and large herbivores. Biologists have concluded there are several prairie species that are dependent on prairie dogs, and the swift fox (*Vulpes velox*) is among those species. In 1999, swift fox research was initiated on the Rita Blanca National Grasslands (RBNG) in the northwestern panhandle of Texas. To date, we have radio-collared and followed the movement of 50 swift fox. The perimeter of prairie dog towns on the RBNG was mapped using a GPS unit in 1999, 2001 and 2003. Telemetry and capture locations of fox were used to determine if there was preferential selection of prairie dog habitats. In 1999, 586 fox locations were collected, of those 8 were within the perimeter of a prairie dog town. In 2001, 165 locations were obtains, and 7 were within a dog town. In 2002, 282 locations were recorded and 8 of those were in a prairie dog town. Swift fox appear to use prairie dog areas proportionally less than their availability.

FUTURE PROJECT

DISTRIBUTION OF SWIFT FOX (*VULPES VELOX*) IN TEXAS

WARREN B. BALLRD, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

ROBERT BAKER, Department of Biology, Texas Tech University, Lubbock TX 79409-2125, USA

ERNEST B. FISH, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock TX 79409-2125, USA

HEATHER A. WHITLAW, Texas Parks and Wildlife Department, Lubbock TX 79409-2125, USA

Project Objective

Identify available potential swift fox habitat within the 25 Panhandle counties surveyed by Mote (1996, 1998) and determine the current distribution of swift foxes within the above-referenced counties.

Project Timeframe

September 1, 2004 – August 31, 2007

Project Procedures

a. Acquire Thematic Mapper (TM) Landsat 7 Imagery for Texas High and Rolling Plains Ecoregions, classify each TM scene for land use and land cover, and interview interested and knowledgeable parties regarding potential swift fox habitats.

b. Using the above procedures, identify potential available swift fox habitat in Texas by: 1) quantifying shortgrass prairie, midgrass prairie, and brush community systems; and 2) identifying available potential swift fox habitat (e.g., short and midgrass prairie areas >20km^2) in the 25 counties originally surveyed by Mote (1996, 1998; Armstrong, Bailey, Carson, Castro, Cochran, Crosby, Dallam, Dawson, Deaf Smith, Floyd, Gaines, Hale, Hartley, Hansford, Hockley, Lamb, Lynn, Moore, Ochiltree, Oldham, Parmer, Sherman, Swisher, Terry, and Yoakum counties).

c. Establish scat transects, search for and collect scat along transects in identified potential habitats, conduct DNA analyses on collected scat following established procedures (Harrison et al. 2002, 2003; Reed et al. 2004) in order to determine species of deposition, and interview interested and knowledgeable parties regarding current and historical swift fox observations.

d. During FY05-06 develop study protocol to: identify potential available habitats; produce a map of potentially suitable and available swift fox habitats within the 25 counties; summarize where swift foxes currently occur or are reported; initiate field studies; and establish scat transects. During FY06-07: continue GIS analyses; continue scat transects; refine habitat and distribution maps; and begin DNA analyses of collected scats. During FY07-08: complete data analyses; prepare final report; and prepare manuscripts for publication. Complete progress reports annually.

LITERATURE CITED

Harrison, R. L., D. J. Barr, and J. W. Dragoo. 2002. A comparison of population survey techniques for swift foxes (*Vulpes velox*) in New Mexico. American Midland Naturalist 148: 320–337.

Harrison, R. L., P. S. Clarke, and C. M. Clarke. 2003. Indexing swift fox populations in New Mexico using scats. American Midland Naturalist: in press.

Mote, K. 1996. Swift fox investigations in Texas. Pages 3-26 *in* B. Luce and F. Lindzey, editors. Annual report of the swift conservation team, 1996. Wyoming Game and Fish Department, Lander, Wyoming.

Mote, K. 1998. Conservation strategy for the Texas Panhandle short grass prairie. Final Report to Federal Aid in Wildlife Restoration and USFWS Section 6 Grant Program. Texas Parks and Wildlife Department, Austin, Texas, USA.

Reed, J. E., R. J. Baker, W. B. Ballard, and B. T. Kelly. 2004. Differentiating Mexican wolf and coyote scats using DNA analysis. Wildlife Society Bulletin 32: in press.

SWIFT FOX IN WYOMING COMPLETION REPORT 2003

MARTIN GRENIER, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY, 82520.

LAURIE VAN FLEET, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY, 82520.

INTRODUCTION

The purpose of the distribution surveys conducted in 1999, 2000, and 2001 were to document recent locations of swift fox in Wyoming**.** Baited track plates placed in a continuous transect up to several miles long with a track plate spacing of 1-mi (1.6-km) between plates was found to be the most effective method for documenting swift fox in areas with potential habitat but unknown population status (Dieni et al. 1997). To establish transect locations, suitable areas of swift fox habitat were determined and randomly selected sections [1-mi^2 (2.6-km^2)] within the areas identified (Olsen et al. 1999).

Surveys to develop baseline transects for monitoring long-term population trends were initiated in 2001. These trend surveys occurred in locations documented to have swift fox during the 1999 and 2000 distribution surveys. Survey methods previously developed were used (Olson et al. 1999). Transects for monitoring population trend utilized a more intensive survey method (5 track plates at a spacing of 0.8-km (0.5-mi) between plates). Approximately 20 transects will be surveyed in each of three geographic regions with each transect no closer than 5-mi (7-km) to another. The method is based on previous findings and estimates that there is an 88% probability that a swift fox will be detected if it occupies an area.

According to Woolley et al. (1995), the current population occurs primarily in 3 geographic regions: Region 1) Laramie Valley and Shirley Basin in Albany and Carbon counties; Region 2) Southeastern Plains – parts of Laramie, Platte, and Goshen counties; and Region 3) Powder River Basin – parts of Converse, Natrona, Weston, and Niobrara counties. Surveys were conducted in the Laramie Valley and Shirley Basin areas in 1999. The Regions 2 and 3 were surveyed in 2000 and 2001.

METHODS

Track plates were made of 16-gauge sheet steel, measured 61-cm x 61-cm (2-ft x 2-ft) painted with 2 coats each of gray primer and gray paint. A 1-gallon weed sprayer was used to coat the plates with talc/carpenter's chalk and ethyl alcohol mixture; the ratio used was 1 cup talc : 1.5 cups carpenter's chalk : 1 gallon 95% ethyl alcohol. This mixture will prepare 40 to 50 plates. Approximately 15-g (0.5-oz) of stirred jack mackerel were placed in the center of the plate as an attractant. Plates were spaced 0.8-km (0.5-mi) apart within public road easements where tracks could be observed without requiring private land access. Track plates were placed along an existing fence if one was present. When a fence was not present, plates were placed 10- to 25-m (33- to 82-ft) from the centerline of the road.

Flagging marked locations of plates and a GPS location in UTM coordinates were recorded for all track plates in each transect. Transects were observed for a maximum of six days, but monitoring ceased the day after swift fox presence was confirmed. This method is designed to detect declines in the population under the assumption that there is an 88% chance that a fox will remain in or return to the same area from one year to the next (Olson et al. 1998). During periods of heavy rain and snow, plates were left in place for up to two additional nights. If rain or snow persisted for more than two nights, the survey effort was abandoned and postponed until favorable weather conditions returned.

Eastern Wyoming was divided into three Study Regions encompassing 10 counties: Study Region 1 – portions of Albany and Carbon Counties; Study Region 2 – portions of Goshen and Laramie Counties; and Study Region 3 – portions of Campbell, Johnson, and Niobrara Counties (Woolley et al. 1995).

Tracks of swift fox were identified utilizing Grenier et al. (2003), recorded, and lifted for future reference and measurements with 2-inch clear packing tape. In some cases, clear contact paper was used to preserve an entire track plate for future use in identifying tracks. Plates were cleaned with a stiff brush or steel wool before reuse.

Baseline transects used during the 2003 monitoring survey were those locations with positive identification of a swift fox track on a track plate during the 1999 and 2000 surveys or known den sites. Recorded den sites along roads were used as center locations for baseline transects. Short and mixed grass prairies mostly devoid of heavy shrub coverage characterized areas where swift fox were most commonly found. Selection of survey routes took into account accidental swift fox observations made by USDA Wildlife Services, Wyoming Game and Fish Department (Department), and Wyoming Cooperative Fish and Wildlife Research Unit personnel.

RESULTS

Surveys were completed in 3 Study Regions and 10 counties in eastern Wyoming (Study Region 1 – portions of Albany and Carbon Counties) (Study Region 2 – portions of Goshen and Laramie Counties) and (Study Region 3 – portions of Campbell, Johnson, and Niobrara Counties). The 2003 monitoring was completed utilizing a field crew of six personnel: the Department provided three personnel, Turner Endangered Species Fund (TESF) provided two personnel, and the U.S. Forest Service provided one. The survey totals for all regions combined are as follows: 795 track plate nights, 134.4-km (84-mi) surveyed, swift fox were detected at 28 of 43 locations, and a minimum of 28.4 track plate nights were required to detect swift fox (Table 1).

Study Region 1: Prior to the initiation of the survey, there existed 18 recent locations/sightings. Swift fox were detected at 16 of the 18 locations (89%). A total of 225 track plate nights were utilized. A minimum of 14.0 track plate nights (2.8 survey nights) were required to detect swift fox.

Study Region 2: Prior to the initiation of the survey, there existed 17 recent locations/sightings. Swift fox were detected at only 11 of the 17 locations (65%). A total of 355 track plate nights were utilized. A minimum of 32.3 track plate nights (6.5 survey nights) were required to detect swift fox.

Study Region 3: Due to poor weather conditions, transects in Niobrara County were not surveyed in 2003. Therefore, the analysis for Region 3 will be limited to Campbell County.

A total of 8 known swift fox locations in Campbell County were utilized, and swift fox were detected at one of the eight locations (13%). A total of 215 track plate nights were utilized. A minimum of 215 track plate nights (55 survey nights) were required to detect swift fox.

Overall for 2003, the detection percentage for all regions increased to 65% (28 of 43) from 52% (25 of 48) the previous year. However, swift fox detection percentages were sill lower than in 2001 (Fig. 1). Swift fox detection percentages in Region 1 remained at 89% (16 of 18), which is an increase from 2001 (Fig 2). Region 2 detection percentages increased in 2003 to 65% (11 of 17) from 29% (5 of 17), but were still lower than in 2001 (Fig 2). Detections in Region 3 were decreased again in 2003 to 13% (1 of 8) in part to bad weather. However, the detection percentage for Campbell County remained the same as in 2002 13% (1 of 8) (Table 2). Results for 2001 surveys are presented in Table 3.

Frequency of non-target species detections per region by year in eastern Wyoming are presented in figure 3. Non-target detections by species percentages are summarized in Table 4.

DISCUSSION

When compared to the results of 2001, it is unclear if the declines recorded in 2003 in Study Regions 2 and 3 are indicative of true declines or are a result of lower detection probability for swift fox in these regions. For example, although in Study Region 2 we observed a decline in detections of swift fox along the survey routes, captures of swift fox by TESF in different target areas within the same Study Region indicate that swift fox are quite abundant within the study area. There exist 5 possible hypothesis for these observations in 2002 and 2003: 1) location of survey routes may bias detection rates, 2) non-target species maybe negatively affecting swift fox detections, 3) development of natural resources in Region 2 and urbanization in Region 3 maybe fragmenting existing swift fox habitat, 4) technique is only applicable in Study Region 1 where it was developed, and 5) any combination of the above.

Overall, non-discreet detections for non-target species in 2003 decreased from 167 in 2002 to 111 in 2003, and were most similar to the results of 2001 (97). However, non-target detection in Regions 2 increased 150% between 2002 and 2003. Three non-target species comprised the bulk (89%) of those detections: striped skunk, domestic cat, and coyote. These species comprised 20%, 43%, and 27% of the number of non-target detections in Study Regions 2, respectively, in 2003. By comparison, in Region 1 striped skunk, domestic cat, and coyote comprised only 70% of non-target species. Red fox were detected second most and comprised 28% of the non-target species detections in Study Region 1 as compared to 0% in Study Regions 2 and 3. Due to track size overlap, it is possible that a small percentage (<25%) of the tracks for these species may have been misidentified by field personnel. However, the results are not believed to be significant due to the low number of detections for both these species in 2003.

The increase in non-target species detections, primarily striped skunk and domestic cat, suggests that the habitat in Study Regions 2 and 3 may be changing. Historically, striped skunk and domestic cat were probably not associated with prairie grassland systems and are more closely associated with human disturbances patterns. Further investigation and, possibly, alternate survey techniques are warranted to determine swift fox population trends in Study Region 2 and 3.

ACKNOWLEDGEMENTS

Special thanks to C. Lockman of the U.S. Forest Service and T. Maechtle of the Wyoming Game and Fish Department. In addition we would also like to thank K. Honness and K. Kunkel of TESF for their assistance in conducting surveys in Region 2.

LITERATURE CITED

Dieni, J. S., F. G. Lindzey, T. P. Woolley, and S. H. Anderson. 1997. Swift fox investigations in Wyoming: Annual Report. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie.

Grenier, M., L. Van Fleet, M. Martin, and M. Purcell. 2003**.** Swift fox completion report. Pages 124-135 in A. O. Cerovski, editor. Threatened, Endangered, and Nongame Bird and Mammal Investigations. Wyoming Game and Fish Department Nongame Program, Biological Services Section, Cheyenne.

Olson, T. L., F. G. Lindzey, and J. S. Dieni. 1998. Swift fox detection probability in southeast Wyoming. Pages 51-65 in C. C. Roy, editor. 1998 Swift Fox Conservation Team Annual Report. Emporia, KS.

Olson, T. L., F. G. Lindzey, and J. S. Dieni. 1999. A proposed protocol for monitoring swift fox in Wyoming. Unpublished manuscript. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie.

Woolley, T. P., F. G. Lindzey, and R. Rothwell. 1995. Swift fox surveys in Wyoming – annual report. Pages 61-76 in S.H. Allen, J. Whitaker Hoagland, and E. Dowd Stukel, editors. Report of the Swift Fox Conservation Team, 1995. Bismarck, ND.

Table 1. Swift fox survey results, 2003.

Study Region	County	Total # of Transects Run	Total # of Track Plates	Avg. # of Plates/Transect	Total # of Nights Run	Total # of Track Plate Nights	Total Miles of Transects	Initial Swift Fox Locations	2003 Transect Detections
1	Albany	12	60	5	38	190	24	11	10
	Carbon	6	30	5	7	35	12	7	6
	Total	*18*	*90*	*5*	*45*	*225*	*36*	*18*	*16*
2	Goshen	7	35	5	42	210	14	8	2
	Laramie	9	45	5	29	145	18	9	9
	Total	*16*	*80*	*5*	*71*	*355*	*32*	*17*	*11*
3	Campbell	8	40	5	55	215	16	8	1
	Niobrara	NA	NA	NA	NA	NA	NA	5	NA
	Total	*8*	*40*	*5*	*55*	*215*	*16*	*13*	*1*
Total (all regions)		*42*	*210*	*5*	*171*	*795*	*84*	*48*	*28*

Table 2. Swift fox survey results, 2002.

Study Region	County	Total # of Transects Run	Total # of Track Plates	Avg. # of Plates/Transect	Total # of Nights Run	Total # of Track Plate Nights	Total Miles of Transects	Initial Swift Fox Locations	2002 Transect Detections
1	Albany	12	60	5	38	190	24	11	11
	Carbon	6	30	5	11	55	12	7	5
	Total	*18*	*90*	*5*	*49*	*245*	*36*	*18*	*16*
2	Goshen	8	40	5	45	225	16	8	0
	Laramie	9	45	5	39	195	18	9	5
	Total	*17*	*85*	*5*	*84*	*420*	*34*	*17*	*5*
3	Campbell	9	47	5.2	1	227	19	8	1
	Converse	8	75	9.4	31	262	33.5	0	0
	Niobrara	11	67	6.1	44	257	28	5	3
	Total	*28*	*189*	*6.75*	*76*	*746*	*80.5*	*13*	*4*
Total (all regions)		*63*	*364*	*16.75*	*209*	*1411*	*150.5*	*48*	*25*

Table 3. Swift fox survey results, 2001.

Study Region	County	Total # of Transects Run	Total # of Track Plates	Avg. # of Plates/Transect	Total # of Nights Run	Total # of Track Plate Nights	Total Miles of Transects	Initial Swift Fox Locations	2001 Transect Detections
1	Albany	12	60	5	36	180	24	12	9
	Carbon	6	30	5	17	85	12	6	5
	Total	*18*	*90*	*5*	*53*	*265*	*36*	*18*	*14*
2	Goshen	17	205	12.1	73	646	231	8	5
	Laramie	15	154	10.3	27	310	68	9	9
	Total	*32*	*359*	*11.2*	*100*	*956*	*299*	*17*	*14*
3	Campbell	10	58	5.8	40	230	24	8	4
	Converse	4	76	19.0	19	335	36	0	0
	Niobrara	6	92	15.3	15	216	43.5	5	5
	Total	*20*	*226*	*11.3*	*74*	*781*	*103.5*	*13*	*9*
Total (all regions)		*70*	*675*	*27.5*	*227*	*2002*	*438.5*	*48*	*37*

Table 4. Non-target detections by species percentages in eastern Wyoming, 2001-2003.

Region	Year	CAFA	CALA	FECA	MEME	PRLO	TATA	VUVU
1								
	2001	0	32%	32%	4%	7%	11%	14%
	2002	0	28%	22%	0	0	0	50%
	2003	0	0	47%	24%	0	0	28%
2								
	2001	0	6%	52%	36%	6%	0	0
	2002	21%	11%	39%	16%	0	16%	11%
	2003	0	27%	43%	20%	7%	4%	0
3								
	2001	0	0	47%	55	45%	3%	0
	2002	0	1%	35%	46%	10%	4%	5%
	2003	0	5%	45%	39%	4%	0	0

Species Codes: CAFA = Domestic Dog
CALA = Coyote
FECA = Domestic Cat
MEME = Striped Skunk
PRLO = Raccoon
TATA = Badger
VUVU = Red Fox

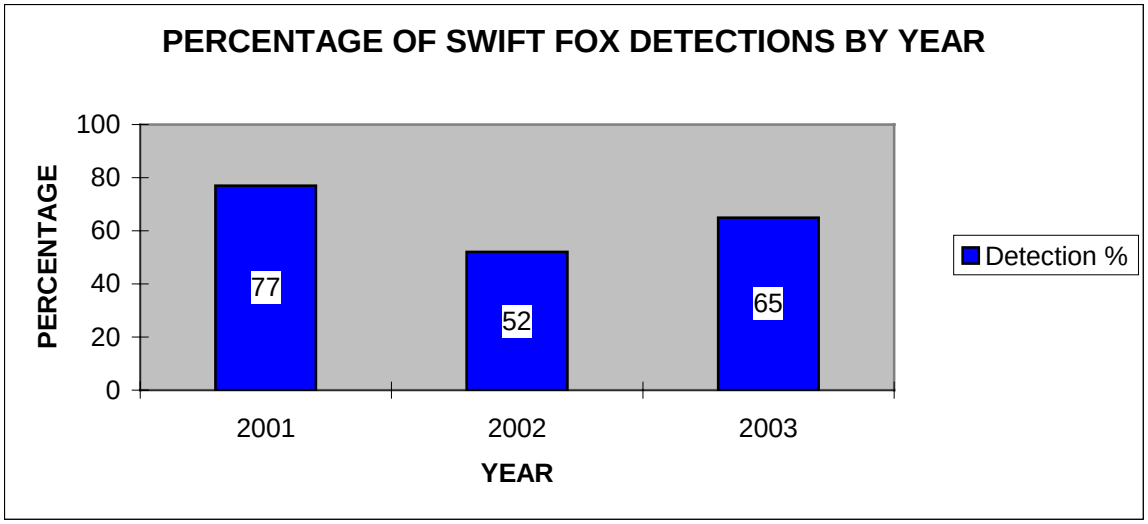


Figure 1. Comparison of swift fox detections percentage for all Study Regions by survey year in eastern Wyoming.

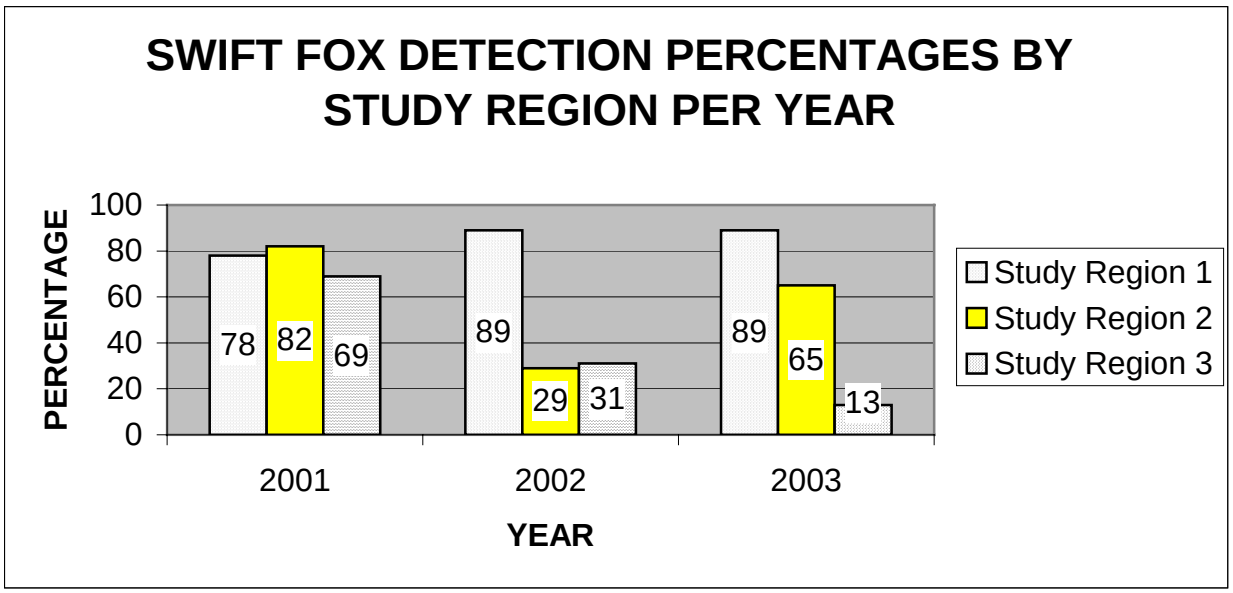


Figure 2. Comparison of swift fox detection percentages by Study Region per year in eastern Wyoming.

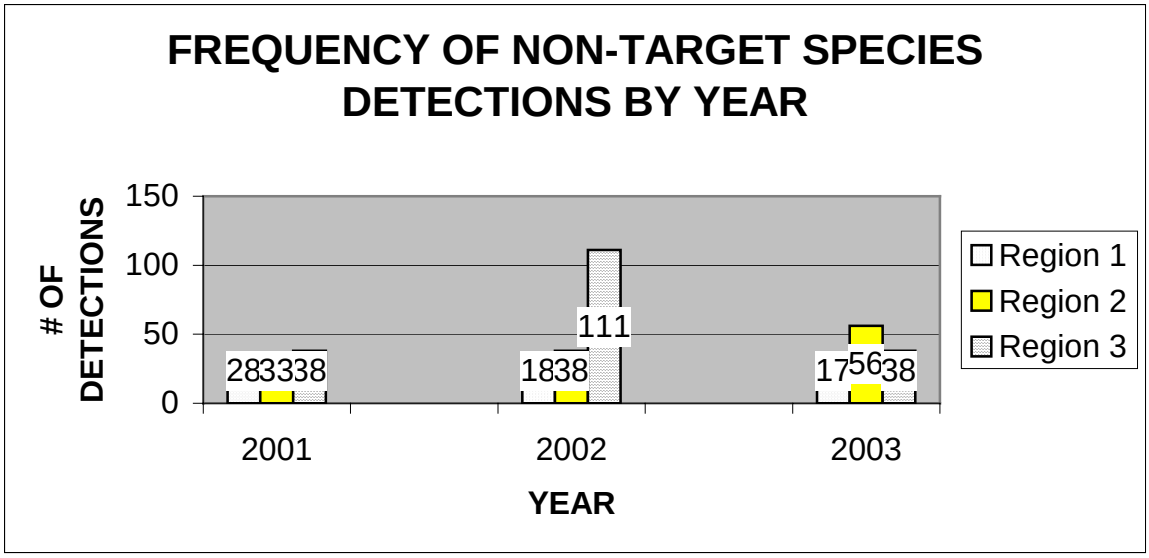


Figure 3. Frequency of non-target species detections per region by year in eastern Wyoming.

STATUS OF SWIFT FOX ON NATIONAL PARK SERVICE LANDS

Dan Licht, NATIONAL PARK SERVICE, BADLANDS NATIONAL PARK, CEDAR PASS R. 240, INTERIOR SD 57750

Swift fox are mostly absent from National Park Service (NPS) lands, with the notable exception of Badlands National Park. That park reintroduced swift fox in the fall of 2003. A full description of that project follows below. A query of the national NPS species database (NPSpecies) did not find any observations or other records of swift presence in NPS units in 2003, in spite of the many mammal inventories being conducted at the various park units. It's unlikely that a resident swift fox population exists at any park unit with the exception of the newly reintroduced population at Badlands National Park.

(The following report, dated December 16, 2003, was prepared by Greg Schroeder of Badlands National Park in cooperation with Marsha Sovada of USGS-BRD.)

FY2003 Annual Report -- Natural Resources Preservation Program
Badlands National Park Service, Midwest Region

EXPERIMENTAL REINTRODUCTION OF SWIFT FOXES IN BADLANDS NATIONAL PARK

MARSHA A. SOVADA, Research Wildlife Biologist, Northern Prairie Wildlife Research Center, 8711 37th St. SE, Jamestown, ND 58401; Ph: 701 253 5506; Marsha_Sovada@usgs.gov

GREG SCHROEDER, Graduate Student-Field Coordinator, Badlands National Park, PO Box 6, Interior, SD 57750; Ph: 605-433-5269; Greg_Schroeder@nps.gov

BRIAN C. KENNER, Chief of Resource Management, Badlands National Park, PO Box 6, Interior, SD 57750; Ph: 605-433-5260; Brian_Kenner@nps.gov

JONATHAN JENKS, PROFESSOR, South Dakota State University, Department of Wildlife and Fisheries, Box 2140B, Brookings, SD 57007; Ph: 605-688-6121; Jonathan_Jenks@sdstate.edu

INTRODUCTION

Swift fox (*Vulpes* velox) are part of the heritage of Badlands National Park (Badlands), and likely were very common prior to the early 1900s, but swift fox were considered extirpated from the park by the mid-1900s. In 2001, the NPS and South

Dakota Department of Game, Fish and Parks co-hosted the annual Swift Fox Conservation Team (SFCT) meeting, which included a tour of Badlands. This gathering of swift fox experts evaluated the area's potential for a successful swift fox reintroduction. Members of the SFCT unanimously agreed that the Badlands/Buffalo Gap Nation Grassland (BGNG)ecosystem possessed excellent potential swift fox habitats and could support a self-sustaining population. It was agreed that one of the most immediate ways to provide recovery of swift fox populations in the northern reaches of their historic range is through reintroduction of foxes into areas with suitable habitat and the potential to bridge to isolated populations. Badlands is an ideal location for reintroduction of swift foxes into an unoccupied area of the historic distribution and to link with an isolated populations in Shannon County to the west and the population being restored on the Bad River Ranch population (described below) to the east.

The Badlands reintroduction is one of several in an effort to restore swift fox to the northern portion of their historic range. Turner Endangered Species Fund (TESF) began a swift fox reintroduction program in 2002 on the Bad River Ranch (BRR) in South Dakota, owned by R.E. "Ted" Turner. BRR encompasses 570 km^2 and is located 50-mi. northeast of Badlands. We are working with TESF personnel and will cooperate with them on joint releases.

Our goal is to reintroduce a viable swift fox population into Badlands/BGNG prairie ecosystem. The United States Geological Survey (USGS) is advising a graduate student and assisting in identifying suitable release sites as well as providing expertise in development of monitoring programs to assess factors affecting survival and recruitment rates to determine reasons for not meeting criteria for success. Herein, we report on the progress of the first year of the reintroduction efforts. Our objective for this year were to: (1) identify the areas within Badlands/BGNG that are suitable for reintroduction of swift foxes based on landscape and habitat characteristics; (2) estimate spatial characteristics of the coyote population in areas identified for swift fox reintroduction in Badlands/BGNG; (3) translocate wild swift foxes from Colorado to selected areas of the park for release; and (4) monitor the released foxes.

METHODS

In preparation for the fall 2003 swift fox release, an Environmental Assessment was completed. A finding of "No Significant Impact" was signed in June 2003.

A landscape level analysis of Badlands and a 32-km buffer surrounding the park (BGNG) was conducted to identify habitat characteristics and suitability for swift fox. A preliminary model was developed with South Dakota GAP land cover data and habitat suitability criteria based on this published information and on input from swift fox experts (Harrison and Hoagland 2003; also see http://wfs.sdstate.edu/sdgap/mammal/mammallandcov/SwiftFox.pdf for GAP criteria). Our purpose for the preliminary model was to identify several suitable release sites. A final model will be developed and evaluated, which will include data such as 10-m

Digital Elevation Models, soil characteristics, and location of prairie dog colonies. Ultimately we plan to test the model with data from the restored population.

We captured and radiomarked coyotes (*Canis latrans*) in March in a coordinated effort with a study of coyote epizootics that is currently being conducted at Badlands/BGNG. Capture of coyotes followed standard protocols developed by the NPS (Badlands National Park 2000). Coyotes were captured with soft catch or offset leg-hold traps or snares with stops that are checked twice daily; methods are the same as used in NPWRC Project 144.03 for capture of red foxes. Captured coyotes were fitted with a Global Positioning System (GPS) collar (<300g, LOTEK GPS 3300). Our goal was to radio mark approximately 16 coyotes each year, attempting to catch at least 1 adult per family unit in the areas identified with suitable habitat for swift fox release. This is adequate because home ranges of adults are approximately similar to that of the family.

The GPS collars collected 1 location per hour and were programmed to drop off in late August, at which time a VHF transmitter was activated to allow recovery of the collars. Data retrieved from the collars was used to estimate coyote home ranges and to evaluate area use by coyotes. This information was used in concert with habitat data to determine locations for release of swift foxes. Our intent was to release foxes in peripheral areas of coyote territories. Territorial boundaries tend to have less coyote activity than core areas of use, thus encounters between the species should be fewer than in high-use areas.

We are reintroducing wild swift foxes rather than captive reared animals because in a Canadian reintroduction program, wild foxes had significantly greater survival than captive born foxes (Carbyn et al. 1994). We capture swift foxes to be reintroduced to Badlands from Colorado in coordination with both the Colorado Division of Wildlife and the TESF. Our goal was to capture approximately 30 swift foxes (15 males, 15 females) in late summer by using box traps (Sovada et al. 1998). Traps were set in the evening and checked in the middle of the night and morning. To maximize diversity and to reduce local impacts, no more that 2 foxes were removed from 1 location (equivalent to an estimated home range size). Foxes were removed from the trap and manually restrained and handled by 2 people. We assessed body condition, collect parasites, and collect blood (NPWRC General Management Procedure 15). We weighed foxes and measured neck, canines, and body length. All foxes were PIT tagged and those selected for translocation were fitted with VHF radio collars (<60g).

There are no cases of confirmed overt disease in swift fox populations (Pybus and Williams 2003). However, we followed recommendations of Miller et al. (2000) and Pybus and Williams (2003) to minimize disease risks during translocation. We collected blood from all captured foxes to test for disease. If a captured fox tested positive for plague, had very high titers for distemper, or showed outward signs of rabies, it was returned to the capture site and released. All foxes were vaccinated for rabies, distemper, infectious hepatitis, leptospirosis, parainfluenza, parvovirus, and corona virus. Foxes received Duramune, Rabvac, and sustained-release Ivermectin. Foxes were also dusted with carbaryl powder and then placed in kennels for <48 hours. Water and dog food

were provided while foxes were driven directly to holding facilities at Badlands for a 14-day quarantine.

In September swift fox (male and one or two females) were released as pairs by hard release methods (Carbyn et al. 1994), that is, pairs were brought to the release site in portable kennels and released. Hard release of swift foxes was proven effective during the Canadian reintroduction of foxes (Carbyn et al. 1994).

Swift foxes were and continue to be monitored via vehicle-mounted telemetry systems to document survival, causes of death, dispersal, and home range establishment. Locations are systematically collected at all times of day, but the majority of locations are collected at night, as swift foxes are largely nocturnal. Occasionally, as required to search for missing foxes, aerial surveillance is conducted.

RESULTS

Habitat Suitability Models

A preliminary habitat suitability model was developed with data from South Dakota Gap Project. We generated categories of predicted or not predicted as suitable habitat based on criteria defined in the GAP project and with input from experts. Within the park and the 32-km buffer, suitable habitat encompassed 80% of the area (Fig. 1).

Coyote monitoring

Beginning in March 2003, 8 coyotes were live trapped and fitted with GPS collars. Location data was retrieved from 7 of these collars and area use by coyote was overlaid with the habitat suitability data to identify suitable fox release sites. Further analysis of the coyote location data is ongoing.

Because we did not reach our goal of 15 coyotes collared in late winter, we placed collars on 11 coyotes in October 2003. These collars were programmed to collect locations every 4 hours from 0600-1800 and every hour from 1800-0600. Collars are scheduled to drop-off the coyotes in August 2004. Trapping will occur in spring 2004 to fit the remaining collars (4) on coyotes.

Swift fox translocation

Forty swift foxes were captured in Lincoln County, Colorado, August 26-28. All foxes were sexed, aged, weighed, vaccinated, and blood was collected for disease analysis. Two swift fox tested positive for sylvatic plague titers and were released at their original capture location. Eight other swift foxes were also released. Thirty swift fox (15 male, 15 female) were transported to Badlands where they were quarantined. All of these foxes were radio collared before being placed in the quarantine pens built at Badlands.

Swift fox release and monitoring

Swift fox were released in Badlands during September 13-15. A pair (male/female) of foxes was released at each of 15 release sites. As of December 10, 2003, 16 foxes were successfully being monitored. Of the remaining foxes, 7 are missing. Contact was lost early in the monitoring phase for some of these animals and they may have dispersed beyond the distance we are able to regularly monitor. They have not been detected with aerial surveillance of the nearby area. On 2 occasions we have observed foxes with collars, but were unable to detect a signal, thus we may have some transmitter failure. We have retrieved 7 foxes that died. Preliminary examination indicated that coyotes likely caused 6 of the 7 mortalities and the remaining mortality was a result of a vehicle collision. Released foxes have generally settled within 8-km of their release site, most often in grazed grasslands.

DISCUSSION/SUMMARY/RECOMMENDATIONS

We were able to identify areas of low use by coyotes that overlapped habitats categorized as highly suitable for swift foxes, which were used as release sites. This was intended to reduce the likelihood of swift foxes encountering coyotes immediately following release. We anticipated that swift fox would have a limited period to orientate to the landscape and habitats prior to contacting a coyote. In the future we plan to compare this approach of providing some protection to the foxes with reintroductions on the BRR where coyote removal is being conducted prior to and during the reintroduction efforts.

Preliminary habitat suitability assessment results seemed intuitively reasonable and we are in the process of completed a more comprehensive assessment model. Thus far, foxes have primarily used areas considered highly suitable.

Translocation of swift fox was efficiently completed with considerable cooperation and assistance from the Colorado Division of Wildlife. We worked with the Colorado Division of Wildlife to ensure that removal of animals to be translocated did not impact the donor populations.

No clear conclusions or attempt to declare the reintroduction a success or failure can be made at this very early stage of the restoration program. The rate of mortality is not surprising; indigenous populations of swift fox studied in other areas have reported mortality of comparable rates and by similar fates (Sovada et al. 1998, Kitchen 1999).

No information is yet available to confirm that any foxes continue to associate with the fox they were release with or have coupled with a different fox. Breeding generally occurs in February and March so we are expecting to determine associations as we approach the breeding season. Data suggest that some foxes are behaving as pairs.

Thus far, progress is on track and we expect to continue to move forward with each step outlined by the project study plan. In the plan we defined criteria for success:

- Initial success (3 years) will be based on breeding of the first wild-born generation of foxes in the release area (Kleinman et al. 1991).
- Short-term criteria (3-5 years) for success will include survival and recruitment rates similar to other wild self-sustaining populations and population growth.

We will assess factors affecting survival and recruitment rates to determine reasons for not meeting criteria for success. We will use adaptive management to modify release and management strategies to alleviate problems.

LITERATURE CITED

Badlands National Park. 2001. Protocol for fecal line transect surveys to estimate predator relative densities in Badlands National Park. G.M. Schroeder, editor. Badlands National Park, Interior, SD 57750. 6 pp.

Carbyn, L., H. J. Armbuster, and C. Mamo. 1994. The swift fox reintroduction program in Canada from 1983 to 1992. *In* M.L. Bowles and C.J. Whelan. Restoration of endangered species: conceptual issues, planning and implementation. Cambridge University Press.

Harrison, R. L., and J. Whitaker-Hoagland. 2003. A literature review of swift fox habitat and den site selection. Pages 79-89 *in* M.A. Sovada and L. N. Carbyn, editors. Ecology and conservation of swift foxes in a changing world. Canadian Plains Research Center, Regina, Saskatchewan.

Kitchen, A. M. 1999. Resource partitioning between coyotes and swift foxes: space, time, and diet. Thesis. Utah State University, Logan, Utah, USA.

Kleinman, D. G., B. B. Beck, J. M. Dietz, and L. A. Dietz. 1991. Costs of a reintroduction and criteria for success: accounting and accountability in the golden lion tamarin conservation program. Pages 125-142 *in* J. H. W. Gipps, editor. Beyond captive breeding: reintroducing endangered species into the wild. Oxford University Press, Oxford, UK.

Miller, D. S., D. F. Covell, R. G. McLean, W. J. Adrian, M. Neizgoda, J. M. Gustafson, O. J. Rongstad, R. D. Schultz, L. J. Kirk, and T. J. Quan. 2000. Serologic survey for selected infectious disease agents in swift and kit foxes from the Western United States. Journal of Wildlife Diseases 36:798-805.

Pybus, M. J., and E. S. Williams. 2003. Parasites and diseases of wild swift foxes. Pages 231-236 *in* M.A. Sovada and L. N. Carbyn, editors. Ecology and conservation of swift foxes in a changing world. Canadian Plains Research Center, Regina, Saskatchewan.

Sovada, M. A., C. C. Roy, J. B. Bright, and J. R. Gillis. 1998. Causes and rates of mortality of swift foxes in western Kansas. Journal of Wildlife Management 62:1300-1306.

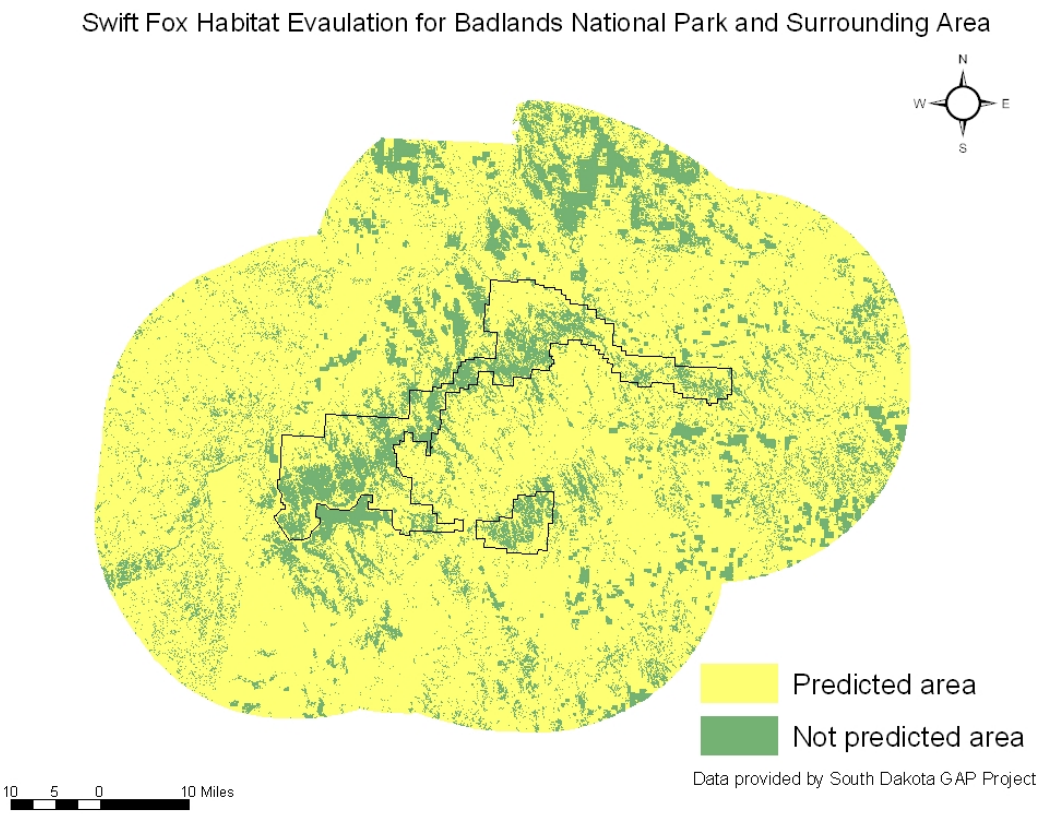


Figure 1. Suitable swift fox habitat based on South Dakota GAP criteria and input from experts.

SUMMARY OF SWIFT FOX INFORMATION FOR THE NATIONAL GRASSLANDS 2003

BOB HODORFF, USFS Fall River Ranger District, P.O. Box 732,1801 Highway 18 Truck Bypass, Hot Springs, SD 57747

DAKOTA PRAIRIE GRASSLANDS
LITTLE MISSOURI NATIONAL GRASSLAND
CHEYENNE NATIONAL GRASSLAND
CEDAR RIVER NATIONAL GRASSLAND
GRAND RIVER NATIONAL GRASSLAND

No formal surveys were completed. We had no incidental sightings in FY2003.

Contact: Dan Svingen

FORT PIERRE NATIONAL GRASSLAND (FPNG) REPORT 2003

No swift fox were known to recently exist on FPNG until Turner Endangered Species Fund (TESF) released them on the Bad River Ranch west of FPNG. Signals were received from several collared foxes on FPNG soon after the releases, although no swift fox are known to currently inhabit the grassland. TESF personnel continue to monitor swift fox from the air and land in the general area, and a more detailed report can be obtained from them. Direct swift fox releases by TESF may occur on FPNG in the future.

Contact: Glenn Moravek

OGLALA NATIONAL GRASSLAND (ONG) REPORT 2003

No formal surveys were completed. A swift fox family is suspected to inhabit leased school land north of Harrison, Nebraska near the ONG, but have not been documented to date. There have been incidental sightings of swift on the ONG but there is no evidence of a resident population. The Nebraska Game and Parks Commission planned swift fox surveys and monitoring on the ONG, but due to poor weather conditions they were unable to conduct the surveys in 2003. They plan on conducting surveys in 2004.

Contact: Jeff Abegglen

THUNDER BASIN NATIONAL GRASSLAND REPORT 2003

No formal surveys were completed by forest service personnel. Track plate surveys were conducted in the fall of 2003 in cooperation with the Wyoming Game and Fish department. The information will be compiled into one report and submitted by the Wyoming Game and Fish department

Contact: Cristi Lockman

CIMARRON NATIONAL GRASSLAND REPORT 2003

No formal surveys were completed by forest service personnel. There is a resident population of swift fox on the Cimarron Grassland.

Contact: David J. Augustine

COMANCHE NATIONAL GRASSLAND REPORT 2003

No formal surveys were completed by forest service personnel. A swift fix telemetry study is being conducted through Utah State University. The study area includes Comanche National Grassland, Pinyon Canyon Maneuver Site (DOD), and private ranches in southeast Colorado. The PhD student is Craig Tompson, working under Dr. Eric Gese. There is a resident population of swift fox on the Comanche Grassland.

Contact: David J. Augustine

BUFFALO GAP NATIONAL GRASSLAND REPORT 2003
WALL RANGER DISTRICT

No formal surveys were completed by forest service personnel. The Badlands National Park (BNP), which is adjacent to the National Grassland, released swift fox in 2003. Conata Basin is a black-footed ferret reintroduction site and many hours of spotlighting were completed on the prairie dog colonies in Conata Basin and the surrounding areas. The only swift fox observed during these surveys were collared foxes that were released by the BNP. A detailed report on the swift fox reintroduction will be provided by the BNP.

Contact: Doug Sargent

PAWNEE NATIONAL GRASSLAND

Formal surveys were conducted in summer of 2003. See attached report.

Contact: Beth Humphrey

FALL RIVER RANGER DISTRICT

Formal surveys were conducted in summer of 2003. See attached report.

Contact: Bob Hodorff

PAWNEE NATIONAL GRASSLAND SWIFT FOX SURVEY FOR 2003

INTRODUCTION AND BACKGROUND

The swift fox (*Vulpes velox*) is endemic to the short and midgrass prairies of western North America. It is conspecific with the kit fox (*Vulpes macrotis*) of the American southwest. The swift fox has declined over much of its former range especially the northern sub-species (*V. velox hebes*). This decline is thought to have been caused by over hunting, trapping and the poisoning programs promulgated against gray wolves and coyotes. It is a former Candidate Species under the Endangered Species Act of 1973, as amended, in the United States and Endangered in Canada. The swift fox is identified as a sensitive species in the 1997 Forest Plan, as amended, for the Arapaho and Roosevelt National Forests and Pawnee National Grassland (Grassland).

To manage for a viable population of swift fox a multitude of information must be gathered on population size, distribution, ecology, and the effects of different management practices on the species.

Identifying potential habitat is the first step in developing a sound management strategy. The second step is to identify occupied habitat, one of the purposes of this annual survey. Cooperation with the Colorado Division of Wildlife, the U S Fish and Wildlife Service, and utilization of the expertise available through the University of Northern Colorado and Colorado State University will be necessary in the development of this strategy.

The Forest Service is a multiple use agency. Dispersed recreational use of the Grassland is multiplying at a steady rate as the Front Range population turns away from the mountains to discover their heritage on the Great Plains. Other uses also have the potential to effect swift fox habitat. It is important to gather enough information to proactively manage for a viable population prior to irretrievable or irreversible commitment of swift fox habitat to other uses due to ignorance of the species needs. Over a number of years this survey information should help establish a pattern of use by swift fox on the Grassland, identifying the key areas of habitat.

METHODS

A standard survey route was established through potential swift fox habitat in 1998. Nocturnal surveys were conducted on 3 consecutive nights in the month of September. September was chosen because the young of the year are up and around and the weather is reasonably comfortable for the surveyors. Approximately 6 hours of continual spotlighting were conducted per night. Survey times, total survey hours, mileage, and other pertenent information will be recorded on survey data sheets (Attachment 1). A survey crew of 2 provided adaquate coverage on both sides of the vehicle.

The crew traveled the survey route at a speed of not more than 20 mph sweeping areas to the front and sides of the vehicle with 1,000,000 candlepower spotlights. An observation was recorded as the sighting of a swift fox or the sighting of appropriate eyeshine. Eyeshine is either amber or green. Animals are often attracted to the first pass of the spotlight causing them to be sighted on subsequent passes. Therefore the spotlight passed at least twice over the field of view. Positive identification of all animals, swift fox and non-target species were attempted and recorded, before continuing the survey.

RESULTS AND DISCUSSION

The swift fox survey for 2003 was conducted from September 23rd to September 25th. A total of 268 miles were surveyed over the 3 nights. Approximately 22.5 hours were expended over the 3 survey nights. Twenty swift fox sightings were confirmed during the survey. This compares to 22 in 2002, 39 in 2001, 80 in 2000, 45 in 1999, 56 in 1997, 54 in 1996, 37 in 1994, 28 in 1993, 30 in 1991, and 14 sightings in the 1990 survey.

Usually some observation of eye shine that appear to be swift fox, from physical and behavioral characteristics, cannot be confirmed. This is due to distances being too great to be confirmed through binoculars or lack of access to get closer from fencing, terrain or land ownership. These occurrences are also mapped as they may provide information useful for future efforts. Five unconfirmed sightings occurred in 2005.

Swift fox appear to be active during all hours of the night. Observations are made at a fairly consistent rate from dusk to dawn. Spotlighting can continue into dawn, until the spotlight is barely visible on the ground, as reflected eye shine is still visible. In 2003, surveys were conducted between the hours of 7:00 PM to 5:00 AM. A majority of the observations occurred while single swift fox were on open prairie as they went about their nightly routine. There was no observations of more than one swift fox.

Reaction to the spotlight varied from running from the light to taking advantage of the light to aid in foraging activities. Spotlighting appears to be an effective method for locating swift fox on the shortgrass prairie. Almost all sightings occur on shortgrass types which were grazed. Over the 10-years of survey, only 2 swift fox were observed in stubble fields. This year 1 fox was observed in CRP and 1 on the badlands.

Swift fox have been observed utilizing cropland in Kansas in areas where the cropland is isolated from native prairie habitat. It appears that swift fox prefer native shortgrass prairie on the Grassland. A few fox, in previous surveys, were observed in a 4-wing saltbush type with a moderately grazed shortgrass understory. Go-back vegetation and short grass types with patches of taller native grasses such as western wheatgrass(PASM) or needle and thread(STCO) appear to be utilized as readily as pure shortgrass as long as they are moderate to heavily grazed. In the Pawnee area, fox are rarely sighted where grass cover is taller than 6-inches as found on Conservation Reserve Program (CRP) land or crested wheatgrass pastures. There is 1 CRP field where 3 swift fox were observed in a shortgrass patch within the field in 1993. Two unconfirmed swift

fox were observed in this same field in 1994 and an additional 2 confirmed fox moved from adjacent shortgrass habitat into the field after being spotlighted for several minutes in 1996. This field presumably contains a den site. One observation occurred in a CRP field on the east half of the Grassland in 1996 and no observations in 1997 or 1999 with one in 2003.

Confirmation of sightings is more difficult in midgrass or shrub habitats when eyeshine is located at a distance or vehicle access is restricted. It is common to see only 1 glimpse of eye shine as many swift fox are not overly interested in the spotlight. Immediate followup by driving towards the animal helps to recapture the animal's attention and confirm the species. If vehicle access is restricted, continued sweeping with the spotlight will usually recapture the animal's attention within a minute. On occasion, 1 person looking through binoculars while the other operates the spotlight during confirmation has resulted in additional swift fox sightings in the distance where eye shine was not visible to the naked eye.

Sightings of swift fox were the lowest of any year except 1990. This continued decrease in sightings is most likely due the severe drought occurring on the grassland in 2002. July and August of 2003 were also abnormally hot and dry following a cool wet spring and may have reduced juvenile survival and caused increased adult mortality. Drought affects swift fox by reducing prey base, which leads to starvation of both pups and adults. Since the prey base must increase before an increase in a predator population, the lower numbers for 2003 are not unexpected. It is estimated that the increase or decrease in a predator population lags that of its prey base by approximately one year. It is also probable that swift fox reduce litter size and/or do not mate when environmentally stressed; leading to a temporary reduction in population size. The lack of multiple swift fox sightings at 1 time and location tends to support this idea.

The survey crew consisted of 2 people per survey period:

Richard E. Hill, USDA, Forest Service. Surveyed September 23th, 24th. , 25th

Steve Kittrell, USDA, Forest Service. Surveyed September 23th , 24th.

Elizebeth Humphrey, USDA, Forest Service. Surveyed September 25th.

ATTACHMENT 1. Survey summary and data sheets.

SURVEY SUMMARY

1. START AND COMPLETION DATES: 9/23/03 to 9/25/03

2. TOTAL HOURS OF SPOTLIGHT SEARCH: 22.7 hours

3. TOTAL MILES SEARCHED BY SPOTLIGHT: 268.1 miles

4. TOTAL SWIFT FOX OBSERVED BY SPOTLIGHT SEARCH:
   20 confirmed and 1 unconfirmed

THE FOLLOWING SPECIES WERE OBSERVED DURING THE SURVEY:

Horned Lark
Domestic Horse
Ord's Kangaroo Rat
Cottontail Rabbit
White-tailed Jackrabbit
Mule Deer
Domestic House Cat
Coyote
Burrowing Owl
Homo sapian
Black-tailed Jackrabbit
Striped Skunk
Antelope
Domestic Cattle

2003 SWIFT FOX SURVEY, FALL RIVER RANGER DISTRICT, BUFFALO GAP NATIONAL GRASSLAND NEBRASKA NATIONAL FOREST

LYNN ALLAN HETLET, USFS Fall River Ranger District, P.O. Box 732,1801 Highway 18 Truck Bypass, Hot Springs, SD 57747

INTRODUCTION

Surveys to determine locations of swift fox (*Vulpes velox*) were conducted on the Fall River District of the Buffalo Gap National Grassland from 1989 through 2002. Of the annual routes established in 1994, only the Ardmore route still shows evidence of a swift fox population. This route was surveyed, and additional acres were surveyed in the newly acquired Hunter land exchange. In addition, the Farmingdale Breeding Bird Survey Route, and a portion of the French Creek Breeding Bird Survey route were surveyed for the presence of swift fox.

SURVEY AREAS

The Breeding Bird Routes surveyed 8,250 acres (Map 1 and 2), the Hunter Land Exchange area surveyed 2,560 acres (Map 3), and the Ardmore route surveys 2,720 acres (Map 4), for a total area of 13,530 acres surveyed for swift fox in 2003.

METHODS

Approximately 180 man-hours (including travel time) were spent establishing and checking bait stations. A bait station consists of a circular area 18- to 20-inches in diameter cleared of all vegetation. A mixture of fine masonry sand and vegetable oil was spread over the area and smoothed. The mixture consisted of 1 cup of oil to 1 gallon of sand.

Approximately one-half ounce of canned Jack mackerel is placed in the center of the station to serve as bait. Because of the swift fox's primarily nocturnal habits, the stations were baited during the early evening hours to decrease the time of drying and therefore insure a high degree of scent dispersal.

This sand/oil mixture holds a track impression quite well, and if insects such as grasshoppers and carrion beetles are not abundant enough to be disturbing the bait and sand, (through either digging or simply hopping through it), it is not necessary to check the sites early; however, the slanting light of the early hours greatly facilitates seeing details in the track. Bait stations were placed approximately 1/4 mile apart in the Ardmore area and the Hunter Land Exchange area, following ridge tops where possible to give better scent dispersal on the evening downdrafts. The bait stations

placed on the Breeding Bird Survey Routes were placed on the designated stopping areas for the bird surveys, which are ½ mile apart. Ideally, each route was run 3 consecutive days. If weather prevented this, any 3 of 5 day combination was acceptable.

RESULTS AND DISCUSSION

The area surveyed on the French Creek Breeding Bird Survey route (Map 1) resulted in tracks of coyotes (*Canis latrans*) at 8 stations, cottontail species (*Sylvilagus spp.*) at 1, domestic dog (*Canis* familiaralis) at 4, domestic cat (*Felis catus*) at 1, black-tailed prairie dog (*Cynomys ludovicianus*) at 2 , and unidentified small rodents at 8, from a total of 48-bait station-nights (Table 1). No swift fox tracks were detected in the area. The presence of coyotes could be a factor in their absence.

The area surveyed on the Railroad Buttes Breeding Bird Survey route (Map 2) resulted in tracks of coyotes at 13-stations, cottontail species (possibly) at 2, striped skunk (*Mephitis mephitis*) at 6, American badger (T*axadea taxus*) at 1, pronghorn (*Antilocapra americana***)** (probably) at 1, unidentified small rodents at 51, and a careless off-road vehicle driver at one, for a total of 150-bait station-nights (Table 2). No swift fox tracks were recorded in the area. The presence of coyotes could be a factor in their absence.

The area surveyed on the Hunter Land Exchange area (Map 3) resulted in tracks of swift fox at 7 stations, striped skunk at 3, and unidentified small rodents at 1, for a total of 96-bait station-nights (Table 3).

The survey in the Ardmore area (Map 4) resulted in unidentified small rodent tracks at 1 station, and swift fox tracks at 4 others, for a total of 93-bait station-nights (Table 4).

It is discouraging to have failed to detect swift fox in the Fox Allotment, where they've been found consistently in the past, but encouraging to have found them in the newly acquired land in the Hunter Land Exchange, immediately to the west and northwest of the Fox Allotment. This strengthens my belief that we are on the edge of a larger area of private land to the north populated by swift fox.

Table 1. Tracks observed on a portion of the French Creek Breeding Bird Survey route (September 3-5, 2003).

Bait Station	Day 1	Day 2	Day 3
35			
36			
37			
38	Rodent	SYSP	
39			
40			
41	Rodent	Rodent	Rodent
42		CAFA, SYSP	
43		CAFA	Rodent
44		CAFA	FEDO
45	CALA		Rodent
46			Rodent
47	CAFA	CALA, Rodent	CALA
48	CASP		CALA
49		CALA	CALA
50		CALA	CALA

CALA – coyote
SYSP – cottontail species
CAFA – domestic dog
FEDO – domestic cat
Rodent – unidentified small rodent species

Table 2. Tracks observed on the Railroad Buttes Breeding Bird Survey (September 3-5, 2003)

Bait Station	Day 1	Day 2	Day 3
1		CALA	CALA
2	CALA		CALA
3		SYSP?	
4	Rodent	Rodent	Rodent
5	ATV		CALA
6	Rodent		
7	Rodent	Rodent	Rodent
8		Rodent	
9	Rodent	Rodent	
10			Rodent
11		SYSP?	
12			
13	ANAM?	Rodent	Rodent
14	Rodent	Rodent	
15	Rodent	Rodent	
16	Rodent		
17	Rodent	Rodent	Rodent
18	Rodent		Rodent
19	Rodent	Rodent	
20	Rodent	Rodent	
21	Rodent	MEME	
22	Rodent	Rodent	MEME
23	Rodent	Rodent	MEME
24	CALA, TYPH	CALA	
25			CALA
26		CALA	
27	Rodent		
28			
29		TATA	
30	Rodent		CALA
31			
32		Rodent	
33	Rodent		
34	Rodent	Rodent	
35			
36			
37	MEME?		
38			
39		Rodent	

Table 2. Continued.

40	Rodent	Rodent	
41			
42	Rodent		
43		Rodent	
44		Rodent	
45	Rodent	MEME	
46		Rodent	
47	MEME	CALA, Rodent	CALA
48		Rodent	
49	Rodent	Rodent	CALA
50		Rodent	

CALA – coyote
MEME – striped skunk
TATA – American badger
SYSP – cottontail species
ANAM – pronghorn
TYPH – sharp-tailed grouse
Rodent – unidentified small rodent species
ATV – all-terrain vehicle

Table 3. Tracks on the Hunter Land Exchange area (portions of the Henry & Mule Creek Allotments). (August 26-28, 2003)

Bait Station	Day 1	Day 2	Day 3
1		VUVE	
2			
3			VUVE
4	MEME		
5			
6			
7			
8			
9			VUVE
10			
11			
12			
13	VUVE	VUVE	VUVE
14	VUVE		
15			
16	MEME		
17			
18			
19	Rodents		
20			
21			
22			
23			
24		MEME	LETO?
25			
26			
27			
28			
29			
30			
31			
32			

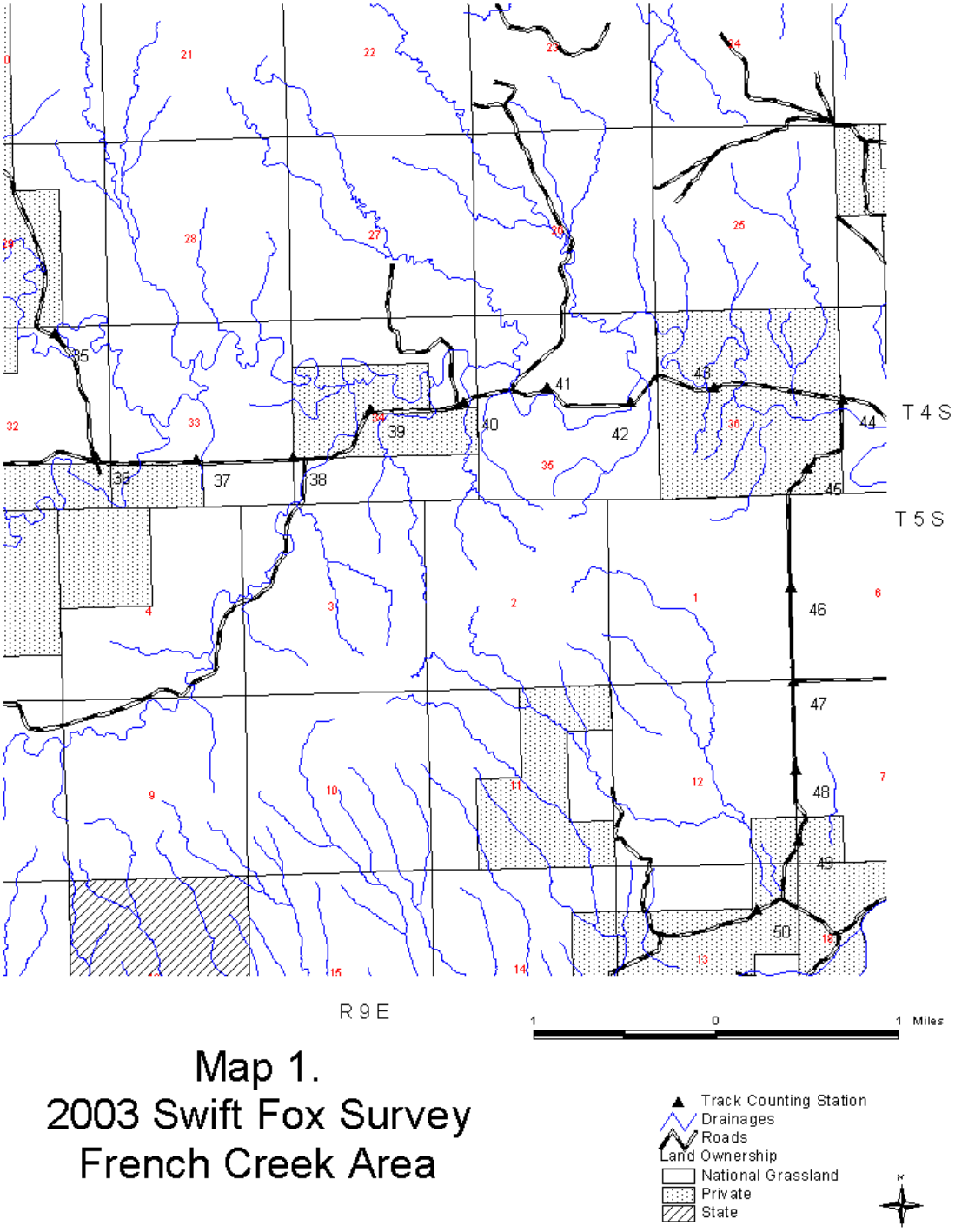
VUVE – swift fox
MEME – striped skunk
LETO – white-tailed jackrabbit
Rodent – unidentified small rodent species

Table 4. Tracks on Ardmore Survey Area (August 5-7, 2003)

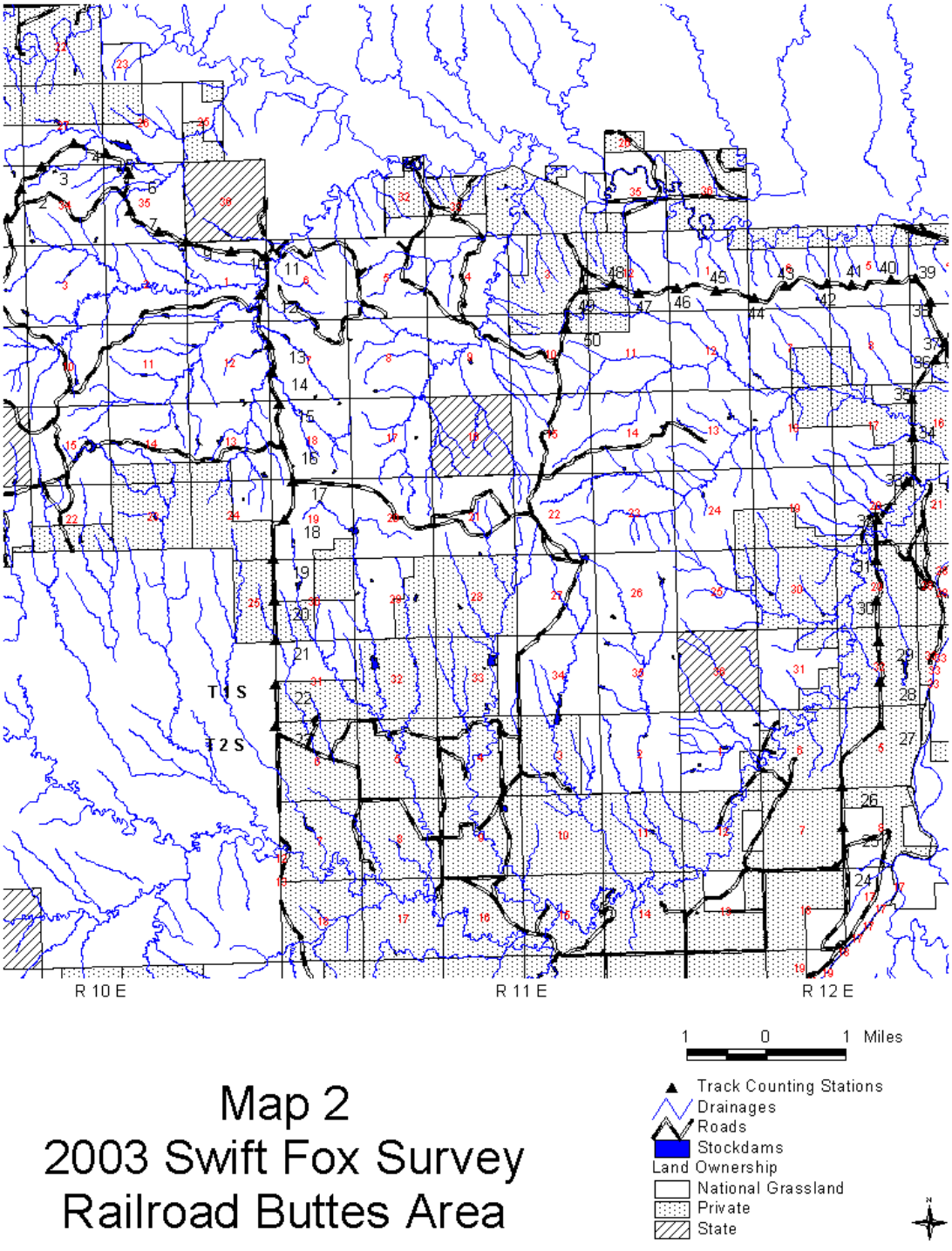
Bait Station	Day 1	Day 2	Day 3
1			
2			
3			
4		VUVE	VUVE
5		VUVE	VUVE
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22		Rodent	
23			
24			
25			
26			
27			
28			
29			
30			
31			

VUVE – swift fox
Rodent – unidentified small rodent species

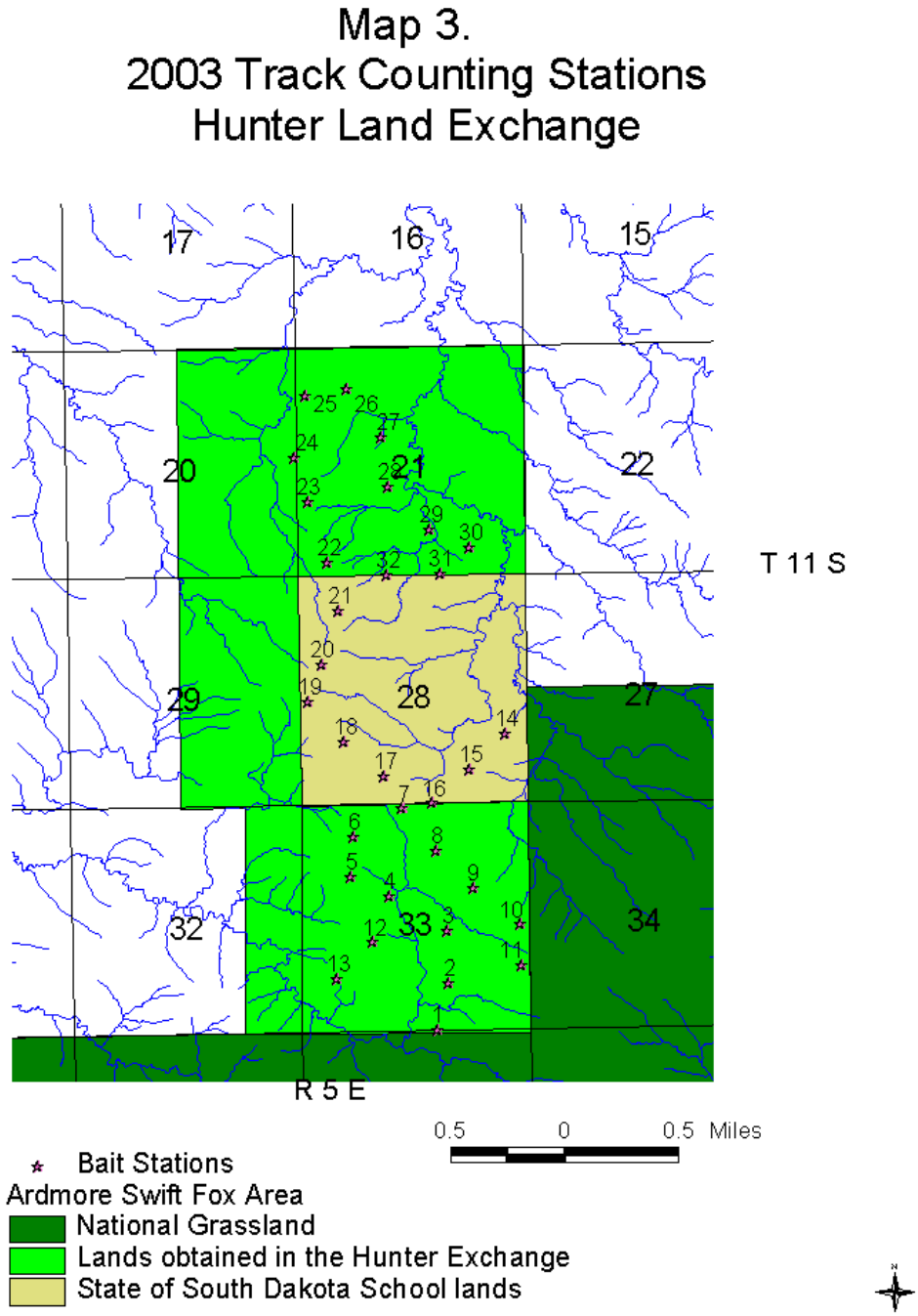
Map1. French Creek survey area, 2003.



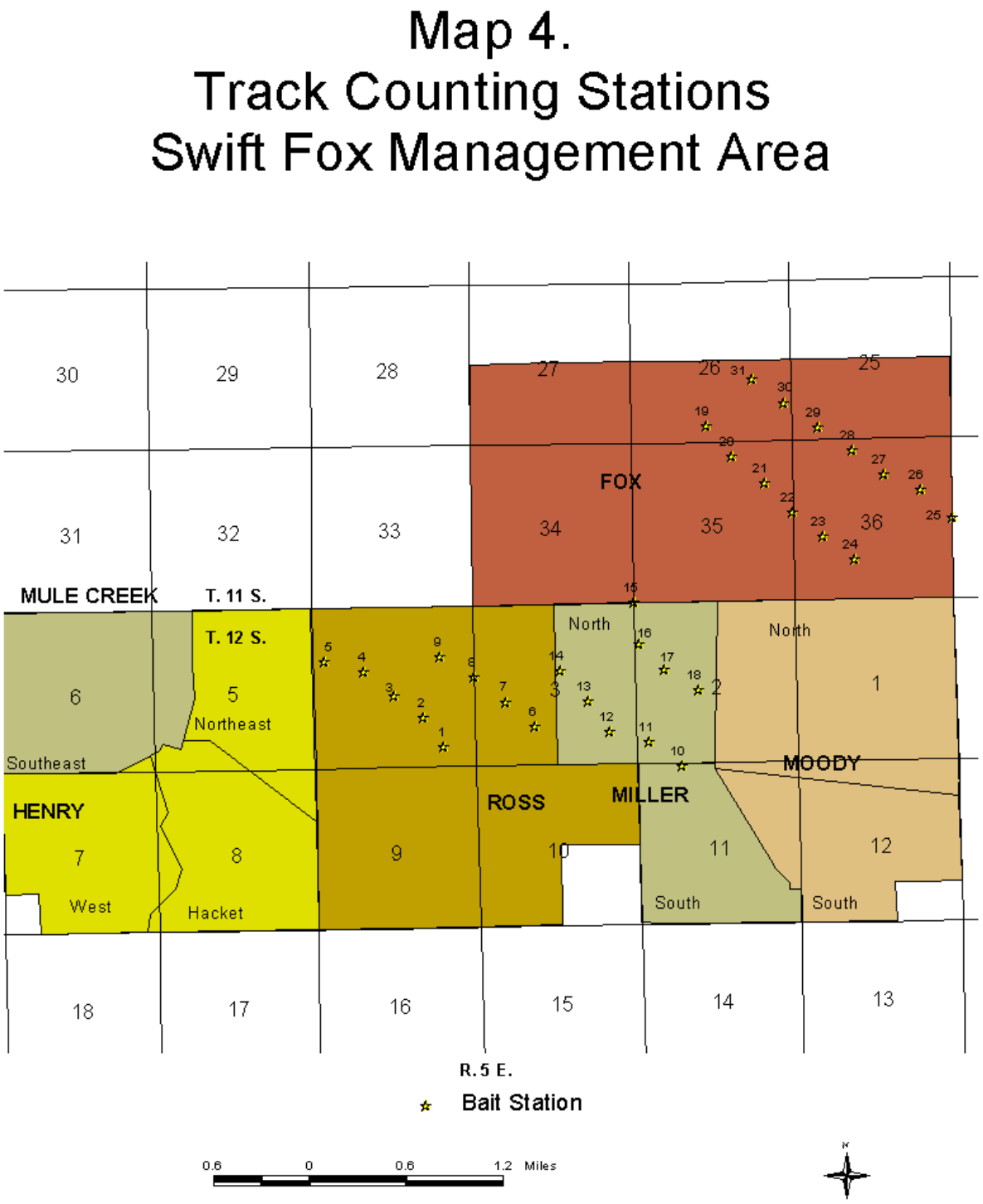
Map 2. Railroad Buttes survey area, 2003.



Map 3. Hunter Land Exchange survey area, 2003.



Map 4. Ardmore survey area, 2003.



SWIFT FOX TRACK SURVEY METHODS AND ANALYSIS - GUIDELINES FOR IMPLEMENTATION

MARSHA A. SOVADA, U.S. Geological Survey, Northern Prairie Wildlife Research Center, 8711 37th St. SE, Jamestown, ND 58401.

GLEN A. SARGEANT, U.S. Geological Survey, Northern Prairie Wildlife Research Center, 8711 37th St. SE, Jamestown, ND 58401.

INTRODUCTION

We developed new survey methods designed to facilitate the estimation of swift fox distributions via the use of Bayesian image models fit by Markov Chain Monte Carlo (MCMC) methods. From 1997 to 1999, we assessed the practicality of using our methodology to conduct landscape-scale surveys of swift fox and to determine if the approach could be useful for long-term monitoring of swift fox populations in Kansas and elsewhere. We believe our survey and analysis produced an accurate estimate of the distribution of swift fox in Kansas, which will serve as the basis for future inferences about changes in the geographic extent of the swift fox range. This report does not include our results or a detailed description and evaluation of our methods, which will appear in *The Journal of Wildlife Management* (Sargeant et al. 2005). Instead, we briefly summarize our method and provide complementary guidance for the collection of required data.

WHY BAYESIAN IMAGE MODELS?

Swift fox are distributed at relatively low densities throughout an extensive geographic region. Survey methods are therefore impractical unless they permit the rapid assessment of large areas. Unfortunately, swift fox are also somewhat secretive and can easily be overlooked during cursory searches. Observations of foxes are therefore informative, but "absences" are ambiguous. By incorporating probabilistic models for detection, Bayesian image models can be used to resolve this problem analytically. Results ultimately include estimates of detection rates and an estimated probability of occupancy, conditional on survey data, for each map unit in the survey region. These results possess a number of desirable statistical and practical advantages over results derived from competing methods, which are discussed in detail by Sargeant et al. (2005).

METHODS / RECOMMENDATIONS

Delineating the survey area

Bayesian MCMC image restoration requires a survey area that can be readily partitioned into a regular grid of non-overlapping mapping units. The survey area should extend beyond the suspected boundaries of the species distribution to be estimated.

Elongate areas are less likely than compact areas to meet requisite assumptions. Boundary irregularities result in mapping units with few neighbors, hence weak support for estimates. Survey areas should thus be contiguous and as compact as possible, with a low perimeter-to-area ratio.

Partitioning the survey area into mapping units

Mapping units should be numerous and small enough to provide sufficient resolution, but must not be too small because they will be assumed to have been closed to changes in occupancy for the duration of data collection. Inappropriately small units are prone to changes in occupancy resulting from, e.g., temporary changes in the occupancy of habitat patches or individual home ranges, which do not reflect true changes in geographic distribution. Note that other aspects of survey methods can change over time; however, changes in map unit size are not permissible because probabilities of occupancy are scale-dependent (i.e., larger units are more likely than smaller units to be occupied). We believe townships (ca. 92-km^2) are appropriately sized map units for swift foxes and used such a grid in Kansas with excellent results (Sargeant et al. 2005).

Sampling designs

Bayesian models of species distributions incorporate models for spatial dependencies among neighboring map units. If a census of map units is impractical, sample map units should be ideally be selected in a systematic, checkerboard fashion (Fig. 1), although Sargeant et al. (2005) achieved satisfactory results for simulations featuring sparser designs. Such a systematic design facilitates the modeling of spatial dependencies and provides good support for estimation throughout the survey region.

Survey schedules

If detection is uncertain, map units must be searched on more than one occasion during each survey so that detection rates (probabilities of detecting foxes, when present, during a single search) can be estimated and incorporated in analyses. Numbers of searches required for satisfactory results depend on detection rates and possibly on features of the distribution being estimated. Simulations presented by Sargeant et al. (2005) suggest a minimum of 3 searches for detection rates $\geq$0.3; 4-6 for detection rates between 0.2 and 0.3; and a minimum of 10 searches for detection rates between 0.1 and 0.2. In actual practice, we suspect detection rates are likely to be much greater than 0.3 if appropriate search methods are used.

Regardless of the number of searches conducted, multiple searches of map units should be completed as quickly as possible to minimize the chance of changes in occupancy between searches. Considerable cost savings can be realized by discontinuing searches in map units once swift foxes have been detected (Sargeant et al. 2005). Surveys can be conducted at any time of year, but survey timing should be as consistent as possible to minimize variation in detection rates. Our preference has been for surveys conducted during August-October because swift fox pups have become active by that time and have begun to venture beyond core areas used by their parents, but generally do not begin dispersing until November (Sovada et al. 2003). We believe this situation

contributes to high detection rates, yet minimizes the risk of detecting transient foxes during dispersal and misclassifying map units as a result.

Methods used to detect swift foxes

The method used to detect swift fox is not critical and can even vary among survey occasions. Suitable methods for swift fox might include track surveys, scent-station surveys, spotlight surveys, or virtually any other approach that facilitates the standardization of search effort among sample units. We have used time-constrained track surveys (Sargeant et al. 1993) with excellent results (Sargeant et al. 2005), and selected them for the following reasons.

1. Track surveys do not require the capture or handling of swift fox.
2. Swift fox tracks are easy to distinguish from tracks of other furbearers (Orloff et al. 1993; M. Sovada, unpublished data)
3. Track surveys are more economical and less time-consuming than other methods of detection (Sovada and Roy 1996).
4. Swift fox detection rates are relatively high for track surveys (Roy et al. 1998, Seidel 1998, Whitaker-Hoagland 1998).
5. Track surveys can be conducted along secondary and low-maintenance roads without first obtaining landowner permission (Sovada and Roy 1996, Roy et al. 1997).
6. Track surveys that target swift foxes can produce valuable incidental information about other furbearers.

Track surveys also suffer from several potential disadvantages, however, and may not be suitable in every setting:

1. Suitable tracking substrates may not always be available
2. Tracking conditions may sometimes be compromised by such factors as weather or traffic.
3. Access to private lands may be required in areas that do not encompass an extensive network of secondary and low maintenance roads.
4. Track surveys (and some other methods) depend critically on the correct identification of swift fox tracks.

Implementing track surveys

Observers should be well-trained in track identification, knowledgeable about habits of furbearers, and familiar with the areas to be surveyed. Observers must be able to distinguish swift fox tracks from similar tracks of other species to prevent false identifications. For example, jackrabbit tracks can be especially confusing to the untrained eye. Observers should also be instructed to record only clear, unambiguous tracks because our methods, which anticipate and accommodate errors of omission, cannot rectify spurious detections.

Track surveys should also be conducted only under suitable conditions. In particular, surveys should not be conducted for 24-48 hours after tracks have been

destroyed by rains, high winds, or human activity. Flexibility in the scheduling of searches is thus a critical consideration for survey planning. In Kansas, for example, we conducted surveys during September-October of 1997 and found that traffic associated with agricultural activities rendered track detection difficult in October. We thus conducted surveys in August and September of 1998 and 1999.

To conduct surveys, observer should be provided with detailed maps that portray mapping unit boundaries as well as primary and secondary roads and trails. Each township should be searched for tracks by examining any natural substrate suitable for track impressions. For each unit surveyed, observers should record the date; unit identifier; start and end time; number of days since the last rain, strong wind, or other event that would obliterate tracks (i.e., track accumulation period: 1 day, 2-3 days, 4-6 days, or >7 days); and the number of sites available to observe tracks (almost none, few, moderate, or many). A sample field data form is provided (Attachment 1).

Observers should focus their efforts on secondary and low maintenance roads, section lines, or other suitable areas where tracks can be observed without having to obtain permission to access private property. In Kansas, we searched townships for a maximum of 120 minutes and found that detections typically occurred within 90 min, if at all (Sargeant et al. 2005). For each track observed we recorded species, soil tracking conditions (hard/dry soil; sandy soil, tracks difficult to distinguish; light/dusty soil, fair tracking conditions; muddy/wet soil, good tracking conditions; dry/loose soil, good tracking conditions; or other; Sargeant et al. 1993), habitat surveyed (range, winter wheat, other crop, or fallow), and the time required to locate the first track. To help confirm identifications and provide a durable record of survey results, suspected swift fox tracks should be measured (mm) and photographed. A sample data recording form and instructions are appended to this document to provide further guidance.

Data analysis

Sargeant et al. (2005) includes a self-contained introduction to MCMC image restoration and a comprehensive description of the MCMC image model we developed to estimate the distribution of swift foxes in Kansas. Unfortunately, the model is conceptually challenging and the iterative process of estimation is difficult to implement. However, the program used by Sargeant et al. (2005) operates on software that can be obtained for free via the internet. We may be able to assist with necessary adaptations if preceding guidelines for data collection are followed.

Analysis via our code requires a summary data file formatted as shown in Table 1. Note that the file contains a record for each map unit and survey occasion, whether a search of the unit occurred or not. In this example, map units 2 and 4 were each searched in 1997, 1998, and 1999. Foxes were detected in map unit 2 in 1998 and in map unit 4 in 1997 and 1999.

TYPICAL RESULTS

Estimation is an iterative process and produces a series of dependent estimates of (1) a detection rate, (2) a coefficient of spatial contagion (Sargeant et al. 2005), and (3) the target distribution. Given a sufficient number of iterations, distributions of values from these Markov chains (Fig. 2) converge to the distributions of variables they are used to estimate (Fig. 3). This means that the mean and variance of the detection rate, for example, can be estimated by the mean and variance of the associated Markov chain. Probabilities of occupancy for map units can be estimated similarly, by averaging the series of maps generated during data processing. Fig. 4A depicts a map used to generate simulated data presented in this report. Resulting simulated data are shown in Fig. 4B. Fig. 4C depicts cells with estimated probabilities of occupancy >0.5, based on data shown in Fig. 4B. In Fig. 4C, 98% of unoccupied townships and 90% of occupied townships are classified correctly. Methods used to generate this simulation are described by Sargeant et al. (2005).

LITERATURE CITED

Orloff, S. G., A. W. Flannery, and K. C. Belt. 1993. Identification of San Joaquin kit fox (*Vulpes macrotis mutica*) tracks on aluminum tracking plates. California Fish and Game 79:45-53.

Roy, C. C., M. A. Sovada, and G. A. Sargeant. 1997. Swift fox (*Vulpes velox*) management and research in Kansas: 1997 annual report. Pages 88-93 *in* B. Giddings, editor. Swift fox conservation team annual report, 1997. Helena, Montana, USA.

Roy, C. C., M. A. Sovada, and G. A. Sargeant. 1998. An improved method for determining the distribution of swift foxes in Kansas. Pages 4-17 *in* C. C. Roy, editor. 1998 Swift fox conservation team annual report. Emporia, Kansas, USA.

Sargeant, A. B., R. J. Greenwood, M. A. Sovada, and T. L. Shaffer. 1993. Distribution and abundance of predators that affect duck production–Prairie Pothole Region. U.S. Fish and Wildlife Service Resource Publication 194, Washington, D.C., USA.

Sargeant, G. A., P. J. White, M. A. Sovada, and B. L Cypher. 2003. Scent-station survey techniques for swift and kit foxes. Pages 99-105 i*n* M. A. Sovada and L. N. Carbyn, editors. The swift fox: ecology and conservation of swift foxes in a changing world. The Canadian Plains Research Center, Regina, Saskatchewan, Canada.

Sargeant, G. A., M. A. Sovada, C. C. Slivinski, and D. H. Johnson. 2005. MCMC estimation of species distributions: a case study of the swift fox in western Kansas. Journal of Wildlife Management:in press.

Seidel, J. 1998. Swift fox investigations in Colorado in 1998. Pages 1-3 *in* C. C. Roy, editor. 1998 Swift fox conservation team annual report. Emporia, Kansas, USA.

Sovada, M. A., and C. C. Roy. 1996. Summary of swift fox research activities conducted in western Kansas - annual report. Pages 64-68 *in* B. Luce, and F. Lindzey, editors. Annual report of the swift fox conservation team, 1996. Lander, Wyoming, USA.

Sovada, M. A., C. C. Slivinski, R. O. Woodward, and M. L. Phillips. 2003. Home range, habitat use, litter size, and pup dispersal of swift foxes in two distinct landscapes of western Kansas. Pages 149-160 i*n* M. A. Sovada and L. N. Carbyn, editors. The swift fox: ecology and conservation of swift foxes in a changing world. The Canadian Plains Research Center, Regina, Saskatchewan, Canada.

Sovada, M. A., M. C. Zicus, R. J. Greenwood, D. P. Rave, W. E. Newton, R. O. Woodward, J. A. Beiser. 2000. Relationships of habitat patch size to predator community and survival of duck nests. Journal of Wildlife Management 64:820-831.

Whitaker-Hoagland, J. 1998. Swift fox investigations in Oklahoma, 1998. Pages 31-36 *in* C. C. Roy, editor. 1998 Swift fox conservation team annual report. Emporia, Kansas, USA.

Wood, J. E. 1959. Relative estimates of fox population levels. Journal of Wildlife Management 23:53-63.

Table 1. Example of summary data file

Map unit	X coordinate of centroid	Y coordinate of centroid	Search occasion	Unit searched	Foxes detected
1	x_1	y_1	1997	0	0
1	x_1	y_1	1998	0	0
1	x_1	y_1	1999	0	0
2	x_2	y_2	1997	1	0
2	x_2	y_2	1998	1	1
2	x_2	y_2	1999	1	0
3	x_3	y_3	1997	0	0
3	x_3	y_3	1998	0	0
3	x_3	y_3	1999	0	0
4	x_4	y_4	1997	1	1
4	x_4	y_4	1998	1	0
4	x_4	y_4	1999	1	1

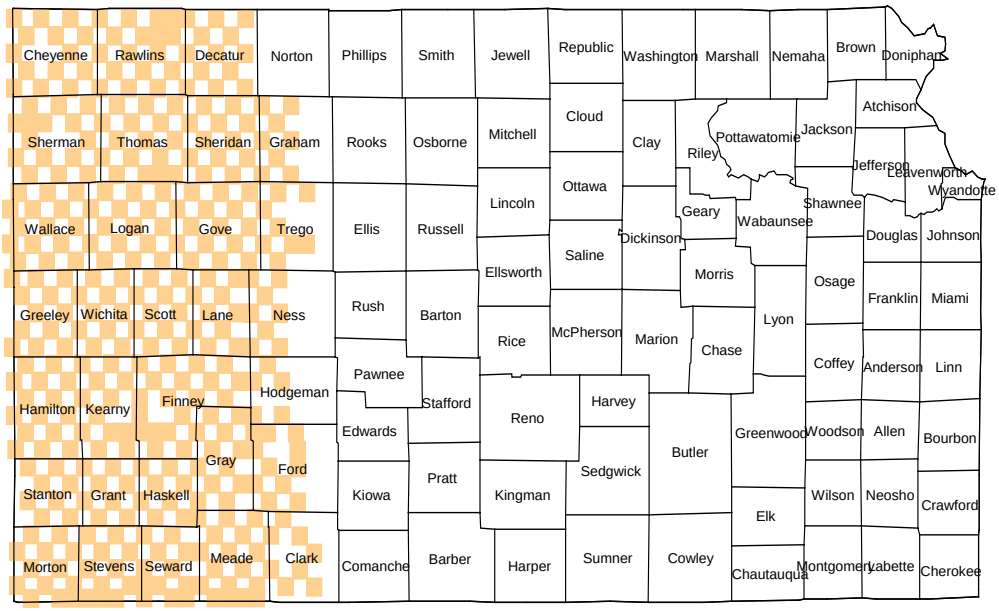


Figure 1. Example of an appropriate sampling design for MCMC estimation of swift fox distribution. Shaded cells represent townships searched for evidence of swift foxes. Based on a survey conducted in western Kansas, 1997-1999 (Sargeant et al. 2005).

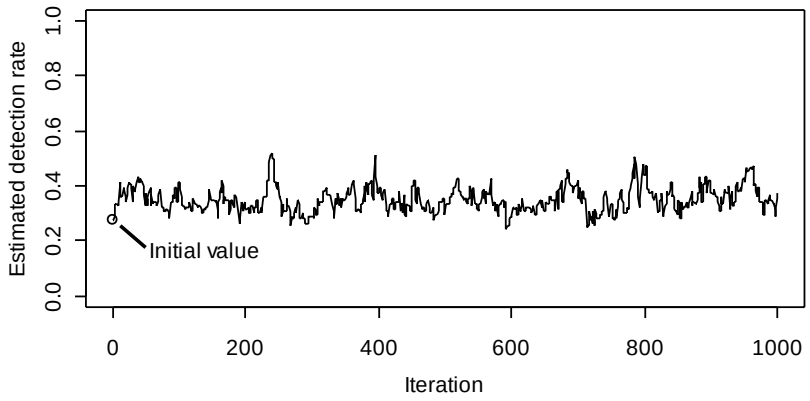


Figure 2. First 1000 iterations of a Markov chain of estimated detection rates. Based on simulated distributional data with a true mean detection rate of 0.30.

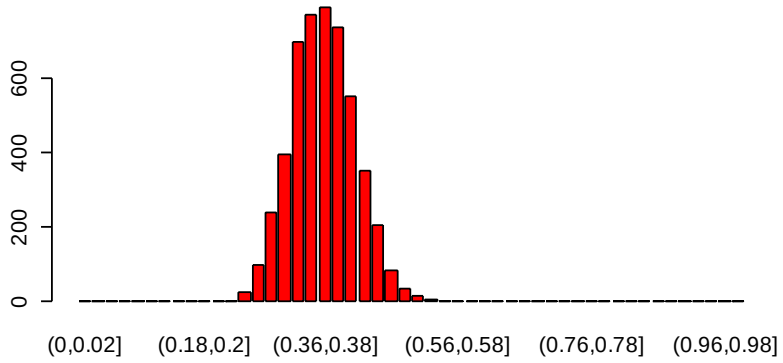


Figure 3. Distribution of values in a Markov chain for detection rates (mean = 0.343, sd = 0.047). Based on simulated distributional data with a true mean detection rate of 0.30.

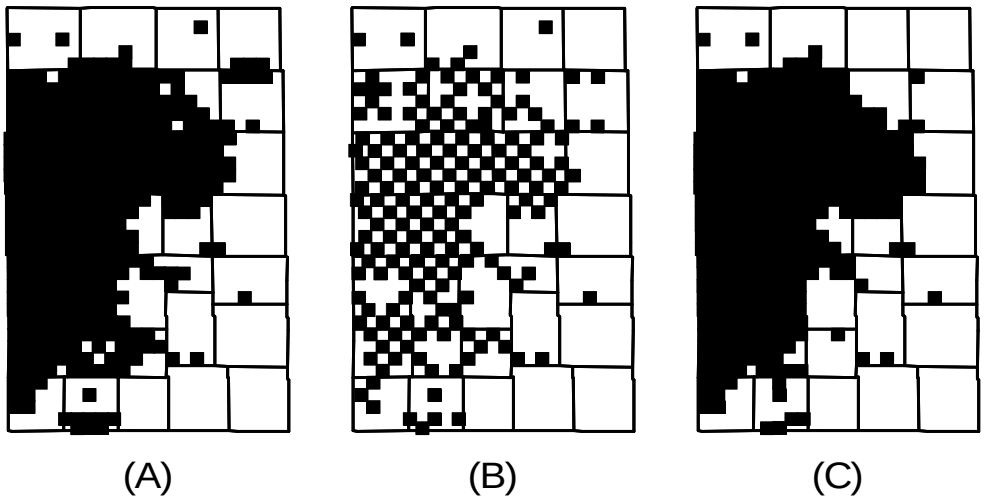


Figure 4. Target distribution (A) used to generate simulated data (B), and estimate of target distribution generated by MCMC image restoration based on simulated data (C). Simulation modeled after Sargeant et al. (2005).

ATTACHMENT 1. Sample field form and instructions.

INSTRUCTIONS–SWIFT FOX TRACK SURVEY FORM

MONTH
DAY
YEAR

OBSERVER'S LAST NAME

COUNTY

TIME START *Military time that you begin the survey of the township*.
TIME END *Military time that you complete the survey of the township*.

TRACK ACCUMULATION PERIOD - *Select best code for number of days since disturbance that would have destroyed tracks (e.g., rain, cultivation).*

1 = 1 day 3 = 4-6 days
2 = 2-3 days 4 = 7 days or more

AVAILABLE TRACK SITES - *Relative number of places available for finding tracks.*

1 = Almost none
2 = Few
3 = moderate umbers
4 = Many (e.g., much soft bare soil such as moist summer fallow field, mud edges around numerous wetlands or numerous trails with soft soil)

SOIL CONDITION FOR TRACKS - *Select best category for condition of soil for finding tracks if an animal had stepped on it in the places you looked for tracks in the township–<u>overall assessment</u> of conditions of the soil at sites you looked at.*

1 = Poor (e.g., soil very soft or very hard, tracks were or would have been indistinct, distorted, or not detectable).
2 = Fair
3 = Good
4 = Excellent (e.g., moist soil and tracks were or would have been distinct.

START MILEAGE *Odometer reading when you start the survey of the township.*

END MILEAGE *Odometer reading when you complete the survey of the township*.

WEATHER - *Provide a brief description of weather. Such as last rain fall or wind storm that changed conditions or affected swift fox movements.*

Swift Fox Track Observations

TIME OF 1ST OBSERVATION OF SWIFT FOX TRACK - *Provide military time that you found the first swift fox track in the township.*

SOIL CONDITIONS-- *Select best category for condition of soil at the sight the track was found.*.

HABITAT - *Select the code that best describes the primary (1') habitat in the area the track was found and the second (2') most dominant habitat in the area the track was found. If the area is dominated by one habitat type, enter that code in both boxes (1' and 2').*

SWIFT FOX REINTRODUCTIONS ON THE BLACKFEET INDIAN RESERVATION, MONTANA: DETERMINING SUCCESS

DAVID E. AUSBAND, University of Montana-Missoula, 203 Health Sciences Bldg., Missoula, MT 59802 (phone: 406243-4104; email: daveausband@yahoo.com)

This synopsis describes swift fox research currently in progress on the Blackfeet Indian Reservation, Montana. Much of the data collected to date has not been analyzed and this brief report merely highlights preliminary findings.

From 1998 to 2002, Defenders of Wildlife and the Blackfeet Indian Nation reintroduced 123 captive-reared swift fox to the 1.5 million-acre Blackfeet Reservation (Reservation) in northern Montana (Figure 1). The main thrust of our current research project is to determine whether more releases are needed. To answer this important question we want to estimate fox abundance and growth rates for the population on the Reservation.

To obtain matrix-based growth rate estimates for the population, we radio-collared both adult and juvenile foxes and have known fates for >30 animals to date. Adult survival in 2003 was approximately 0.60. In addition, juvenile survival from September 2003 through May 2004 (9 month) was approximately 0.45. The proportion of foxes reproducing in 2004 was 0.60 for juveniles and 0.70 for adults. Also, kit survival from May-August 2004 was approximately 0.69. Although survival data have not been fully analyzed, current estimates are indicative of a growing population. Sample sizes of radio-marked foxes for 2004 are 23 and 19 for adults and juveniles, respectively. Coyotes have been the largest single contributors to swift fox mortality (47%), with raptors, vehicles and unknown causes accounting for the remainder of mortality on the Reservation (Figure 2). In order to estimate fecundity for both juveniles and adults, field crews located 14 natal dens (Figure 3) and observed a total of 82 animals during the summer of 2004.

We have also begun efforts to further familiarize the public on and around the Reservation with the swift fox reintroduction project. In particular, we offered $100 rewards during the summer of 2004 for reports that lead us to previously undiscovered natal dens. By advertising this reward in local newspapers and having an informational booth at the Native American Indian Days pow-wow in Browning, Montana we were able to obtain locations of 5 additional natal dens. We believe that even if the public had not reported natal dens during the summer of 2004 (which they did), the value of our outreach efforts cannot be overstated and will benefit us in future population monitoring.

The current research project will continue through autumn of 2005. Any decisions regarding further population augmentation will be conducted after the author analyzes the collected data and formally submits a thesis with the University of Montana-Missoula.

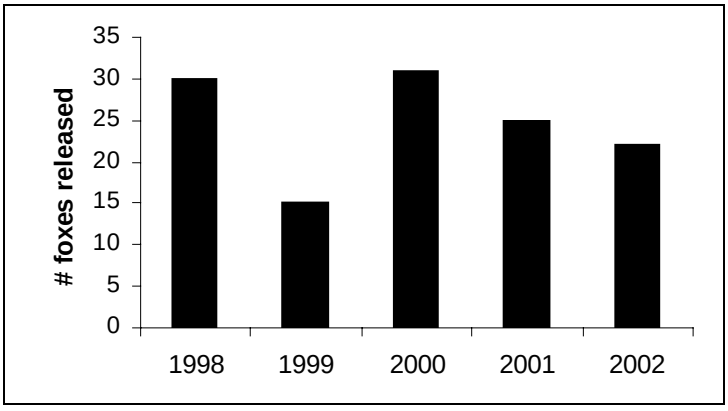


Figure 1. Number of captive-raised swift fox released on Blackfeet Indian Reservation, Montana (1998-2002).

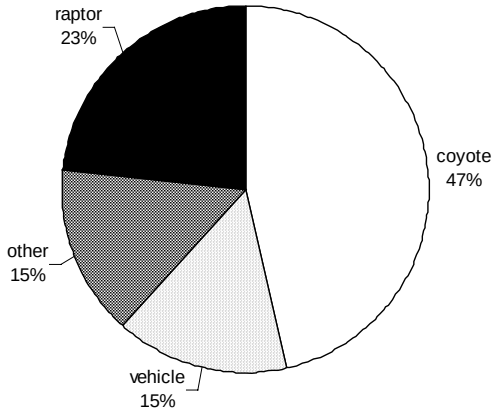


Figure 2. Causes of radio-collared swift fox mortality on the Blackfeet Indian Reservation (May 2003-September 2004).

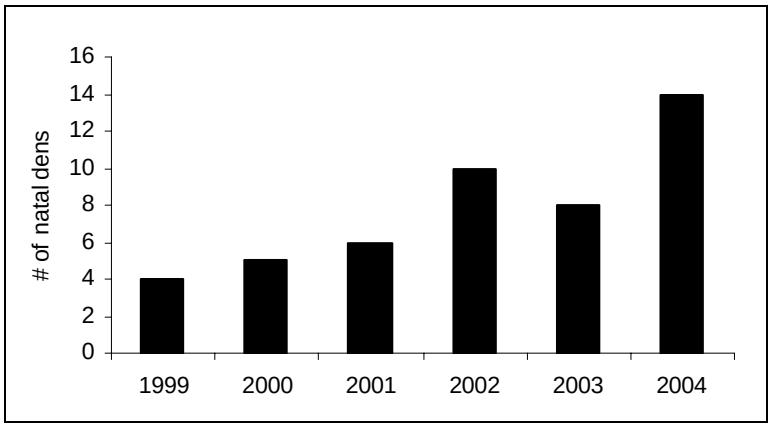


Figure 3. Number of natal dens located on Blackfeet Indian Reservation, Montana (1999-2004).

TURNER ENDANGERED SPECIES FUND SUMMARY OF SWIFT FOX ACTIVITIES ON THE BAD RIVER RANCHES, SOUTH DAKOTA, 2003

KYRAN KUNKEL, Turner Endangered Species Fund, 1123 Research Drive, Bozeman, MT 59718

ABSTRACT

We translocated 11 adult (5 males, 6 females) and 19 juvenile (7 males, 12 females) swift fox from southeast Wyoming in the fall of 2002 for reintroduction on Bad River Ranches in western South Dakota. We hard released 20 of these foxes between September 30-October 7

We held 5 pairs, 8 juveniles and 2 adults, over winter for soft releases in 2003. Two of these foxes escaped from holding pens in March and we released the remaining 8 in October 2003. We translocated 9 adults (5 males, 4 females) and 13 juveniles (4 males, 9 females) from Wyoming in the fall of 2003. We hard released 21 of these foxes during October 2003. Swift fox ranged widely upon release. Mean distance between successive locations ranged from 0.8- and 11.7-km. In 2002, 4 of 6 adults remained in the study area and 4 of 9 juveniles dispersed from the project area. Three of 6 males and 6 of 9 females remained in the project area after the 2002 release. Only 1 adult male fox of the 10 foxes hard released in 2003 dispersed. Two of the 10 soft released foxes dispersed. Swift fox selected to use areas closer to roads and farther from water than expected based on availability throughout the project area. Swift fox selected areas that were slightly more rugged and had greater slope but that were at similar elevation to what was available throughout the project area. Swift fox selected sites in areas with a lower percentage of cropland than expected based on availability throughout the project area. Locations of fox death sites were more rugged and lower in elevation than locations that live foxes used. Locations of death sites were also in areas of lower percentage of croplands than were live locations. Slope did not differ between these classes of site. Death sites were closer to water and roads than live sites. There were no differences in GAP land cover classes between death site and live locations.

The overall one-year survival rate for all hard released foxes excluding missing animals was 0.44 (95% Confidence Interval [CI] = 0.27 – 0.73). The coyote-caused mortality rate was 0.33 (95% CI = 0.12 – 0.55). When missing animals were included as mortalities the survival rate fell to 0.30 (95% CI = 0.15 – 0.58). The survival rate over 70 days after the 2003 hard release was 0.42 (95% CI = 0.23 – 0.80). The coyote-caused mortality rate was 0.49 (95% CI = 0.22 – 0.77) and human-caused rate was 0.08 (95% CI = 0.00 – 0.24). When missing animals were included as mortalities the survival rate fell to 0.29 (95% CI = 0.14 – 0.63). The survival rate over 70 days after the soft release in 2003 was 0.43 (95% CI = 0.27 – 0.70). The coyote-caused mortality rate was 0.38 (95% CI = 0.17 – 0.58). When missing animals were included as mortalities the survival rate fell to 0.41 (95% CI = 0.25 – 0.66). Ten foxes paired up after hard releases in 2002.

Four of these pairs produced litters of 4-5, 4, 4, and 4 pups. Three of the 4 pairs of foxes held in pens for soft releases produced litters of 3, 4, and 5 pups. One year after hard releasing 20 foxes, 10 had been killed and 4 were missing and 4 litters totaling 16-17 pups were added yielding a total population of 22-23 foxes in the restoration area, a net gain of 2-3 foxes since release (lambda = 1.10). We achieved short and mid term criteria we established for success. We will continue releases but probably focus them away from the more rugged topography of the Bad River. We will also conduct a greater proportion of soft releases as these appear to reduce dispersal and thereby enhance survival. We will also work to intensify our coyote removal efforts to try and achieve our goals for coyote-caused mortality.

SWIFT FOX CONSERVATION TEAM ANNUAL MEETING
USGS-BRD OFFICE, FORT COLLINS, CO
SEPTEMBER 16, 2003

EILEEN DOWD STUKEL, South Dakota Department of Game, Fish, and Parks, 523 East Capitol, Pierre, SD 57501

MEETING CALLED TO ORDER

Jacquie Ermer, Team Chair, ND Game and Fish, began the meeting at 8:20 a.m. with introductions and a thank you to Francie Pusateri for making meeting arrangements. No changes were made to the agenda.

Martin Grenier, 2002 Annual Report Editor, Wyoming Game and Fish: The 2002 report is available; team members will receive one hard copy and a CD; others can request copies from Martin.

Jacquie circulated an updated team list and asked for corrections. List of meeting participants is provided in Table 1.

COMMITTEE REPORTS

Education

Eileen Dowd Stukel, SD Game, Fish and Parks Dept., had no committee report. Pete Gober and his staff (Joy Gober and Charlene Bessken) completed the annual team newsletter (handout), and they are willing to do the newsletter again next year.

Habitat

Julianne Hoagland; OK Dept. of Wildlife Conservation: Committee activities were limited to the National Fish and Wildlife Foundation (NFWF) grant, which Marsha Sovada will discuss later; an updated paper summarizing swift fox habitat literature is included in the new swift fox book.

Pete Gober: distributed a portion of Jan Kamler's Ph D dissertation from Texas Tech University. Kamler concluded that swift fox are closely tied to native habitats (habitat specialist), which is somewhat contrary to SFCT conclusions about swift fox habitat needs; a relevant paper was published recently in the Journal of Mammalogy. Pete discussed the relevance of the habitat issue to the removal of swift fox from candidate list and factors related to it. Heather Whitlaw, Texas Parks and Wildlife: one of the cooperating landowners on the study area used by Jan has since broken out 4 sections of native grassland and planted it to corn; 2 new Ph D students

are working at the same study area, with 2½ years remaining in their studies.

UPDATE ON HABITAT PROJECT

Marsha Sovada, Northern Prairie Wildlife Research Center: The new swift fox book (The Swift Fox: Ecology and Conservation of Swift Foxes in a Changing World, Canadian Plains Research Center – order forms were distributed) has been released; each first author of a paper will receive a free copy; Lu Carbyn sent his regrets about missing the meeting and sent along a copy of his new book on the buffalo wolf (The Buffalo Wolf: Predators, Prey, and the Politics of Nature, Smithsonian Institution Press).

NFWF Grant – Marsha distributed a one-page progress report that was submitted to NFWF. Amy Zimmerman worked under Marsha on the project; funding has run out, and Amy has since left Northern Prairie, no progress has been made since July 2003.

A total of 12,300 data locations have been compiled, with varying levels of location precision (through 2002). Sources of these data points include telemetry, captures, road kills, tracks, and sightings; also have a database of survey results where no swift fox detections were made. Data points are categorized by location precision and habitats associated with locations; they are trying to develop a predictive model, using land cover/vegetation, road density, human density, slope, and soil characteristics. This was developed for the historical range of swift fox; they used Kansas as a subset to begin building the models; points are buffered with 2-km radius, buffers do not overlap; logistic regressions are being done to model locations with and without swift fox. Preliminary results: no single model stands out; Akaike's Information Criterion (AIC) values were similar for first 10 models (precipitation may be driving the model). In the model, swift fox presence was positively related to soil suitability and negatively related to road density and precipitation.

Next steps in the process includes moving down the scale from GAP for vegetation data. Pete: How old can records be to be representative of current distribution and how are data to be obtained? This could be a task for the research committee. How to integrate habitat conversion, which could dictate shorter timeframe? Pete: Next annual report should include an updated species distribution map.

Action Item: Research Committee should draft a position/rationale for the appropriate time that records should be used to describe distribution.

The Conservation Strategy states that swift fox distribution be monitored/revisited every five years; the next revision is due by 2006. How often should a distribution map be published, and when should records be dropped from a map with presence/absence by county? How do you factor in various levels of effort? Axel: There is not enough trend-over-time data to drop off records, so there is not good data to allow you to establish a cut-off time. How about a subsampling effort across the range to help determine population trends?

Funding issue – NFWF funding is gone; Marsha would like support for her salary contribution to the project. Brian Giddings, Montana Fish, Wildlife and Parks: leftover funding in Montana; some may go to Axel for census follow-up.

Marsha: Kansas township-level presence/absence data collection is producing interesting results. We are able to efficiently survey large areas (all of western Kansas) for relatively minimal cost. With the Markov Chain Monte Carlo analysis of the presence or absence data, we can build a model that determines the probability of swift fox presence in non-surveyed townships and then with spatial smoothing we develop a distribution map. The survey can be repeated several years later and compared to the prior map to estimate changes in distribution. The assumptions of the approach are no different that those of other types of surveys. Essentially we get more for the dollars invested. A paper will be submitted to the Journal of Wildlife Management this year, and Glen Sargeant is developing a "user friendly" program that uses free software available on the web that will allow anyone to analyze their data using Markov Chain Monte Carlo analysis of presence/absence data. Fred Lindzey, University of Wyoming: importance of using standardized techniques for making conclusions about species distribution. Brian Giddings: Issue of a standardized survey technique has been a topic of team discussion since 1996. Marsha: Kansas, Oklahoma, and Nebraska, to some extent, are using the township presence/absence technique, where every other township is surveyed for sign.

Action Item: 1) Team Chair should send an annual request each January 1 to SFCT and cooperators for new records from the previous year for Marsha. 2) Marsha will work on an annual budget needed to support this work.

Point was made that once database and model are established, annual funding need may be minimal. Marsha requested that Pete, the Team, and others send letters of support to her director supporting continuation of the swift fox habitat/distribution work. Marsha also reminded everyone to send her or make her aware of any new swift fox literature to add to Northern Prairie's web-site (handout of most recent papers added).

UPDATE ON SPECIMEN DEPOSITION STORAGE BANK

Mike Fritz, Nebraska Game and Parks Commission, presented a handout on the procedures that Richard Bischof established with the University of New Mexico. The museum would like 30 samples (one sample represents an individual animal) from each region (handout includes map). Richard suggested that someone write up a summary of why this project is important to be included in annual report and to serve as a justification for this work and to set deadlines for when the samples are submitted. Suggestion that Jerry Dragoo be asked to write justification. Question of whether Jerry provided input on the suggested regions. Reintroduction projects should allow easy collection of samples from Colorado and Wyoming source sites. Axel: Is there a commitment for analysis by University of New Mexico if this is to serve as the repository? UNM has offered to serve as a repository in case research opportunities arise.

Action Item: Work with Jerry Dragoo to define research questions that Team would like to see addressed with provision of these samples. Jacquie will follow-up with Jerry on these issues. Request from Mike on behalf of Richard that people review the document from UNM (protocol for swift fox specimen submission) and give feedback to Richard.

STATUS OF REINTRODUCTION ON BAD RIVER RANCHES IN SOUTH DAKOTA

Kyran Kunkel, Turner Endangered Species Fund (TESF), reviewed project objectives, justification, and site selection; hope to expand swift fox population in SD outside current known distribution in Fall River County; proactive management believed to be needed to expand population and compensate for habitat fragmentation issues; 8 current cooperators; potential link to Badlands National Park reintroduction project; reviewed public outreach strategies used to seek local support; use of swift fox as a flagship species for grassland protection; additional public involvement done to get SD Animal Industry Board approval; modeling reintroduction on IUCN Guidelines; examined habitat, predator densities, and prey base prior to reintroduction.

Built quarantine/holding facility at the site; reached goal of 50% coyote reduction; established success criteria; during the fall of 2002, source population was in southeastern Wyoming; TESF personnel assisted with population assessments at this site to determine impacts from removal; swift fox were radioed, pit-tagged, vaccinated, treated for external parasites, and tested for diseases; those that tested positive for plague titers were not taken from Wyoming.

Captured 21 females and 21 males; returned 12 because of plague antibody titers; no other diseases detected; released 22 foxes in late September 2002; held 8 animals for soft release over winter; weight increased over winter; these animals have not yet been released.

TESF is planning releases for 6-10 years and data collection for a total of 10 years; difficult to track foxes, difficult and expensive to locate the animals from the air; 4 killed by coyotes, 4 hit by vehicles, 6 dispersed from study area (unknown what happened – not counted as coyote mortality).

First mortality occurred 6 weeks after release; all mortalities documented in grasslands, and all mortalities documented outside of Bad River Ranches (unknown how much coyote reduction outside BRR); reproduction was documented the first year in the wild and in captive animals; escape terrain doesn't appear limiting; adults stayed in area, and males dispersed more than females; seeing large dispersal distances; several foxes moved 30-40 miles; observed a pulse of movement during the breeding season.

Brought several pups into captivity (parents were killed); have recollared 12 foxes; captive weight gain averaged 0.6 kg; continuing to monitor prey and predators.

Currently have a total of 39 foxes, including captive animals; bringing 20 from Wyoming and plan to bring another 10 for soft releases; poor trapping success in Wyoming this year – 4 foxes per 100 trap nights, with 50% plague positive for titers; may include Fort Pierre and Lower Brule Reservation in future releases; unsure how to address road mortalities; will continue to evaluate release techniques, dispersal information, and public involvement.

Project cost: $80,000 first year, $40,000 additional years (operation costs only); question about need/justification for coyote control prior to reintroduction; TESF does not intend to continue coyote reduction beyond what is needed to allow foxes to establish a foothold; additional study interest – do they need to continue soft releases, which are more expensive; no data yet from soft releases.

STATUS OF REINTRODUCTION EFFORTS IN BADLANDS NATIONAL PARK, SOUTH DAKOTA

Marsha Sovada: reporting on behalf of Greg Schroeder: Captured 40 foxes in Colorado; followed procedures already described by Kunkel; quarantined for 14-16 days; started releasing on September 13 for public

viewing, continued releases through September 15; no coyote control; doing similar monitoring of prey and predator populations; only hard releases; 6 coyotes fitted with GPS collars in the area.

RESULTS OF DISTRIBUTION SURVEY IN MONTANA

Brian Giddings: Described work conducted in 1999, 2001, and 2002: a statewide survey to document current distribution; to document range expansion in eastern Montana; and survey suitable habitat in southeastern Montana adjacent to Wyoming population; used Kansas survey method, which is described in the 1997 SFCT annual report (alternate township surveys to find tracks and other sign at 2 hours/township); Montana used contract personnel and surveyed both public and private lands; started with 15-17 counties with suitable swift fox habitat, then selected townships, for a total of 400 townships; surveyed during the falls of 1999, 2001, and 2002. This work differed from the Montana/Canada swift fox census of 2000/01, which estimated Montana's swift fox population at 225 animals.

Statewide surveys documented swift fox extensions west of known range, including detection of swift fox on the Blackfeet reservation; found swift fox south of the Milk River for first time and detected swift fox near the Wyoming border for first time; saw some overlap with 2000-2001 census information, but also detected additional locations; documented population expansion since 1997.

Investment/return: 36,000 square miles surveyed for contracted cost of $12,500 (3 fall survey sessions); method is easily replicated; plan to repeat survey to some extent starting in 5 years to monitor changes in swift fox distribution in Montana; chose sample areas based on occurrence information for the past 25 years and based on suitable habitat (grassland size, terrain, etc.), which was described in a previous report in SFCT annual report; fall was selected because of the unpredictability of snow cover and lack of overlap between swift and red fox tracks at this time of year; the group had a discussion about possibility of misidentification of tracks.

Sovada: These data points are useful in describing presence/absence on a rangewide basis, but to go the next step in relating detections to habitat, additional information will be needed at detection points; the model she is working on will address different detection probabilities.

UPDATE ON BLACKFEET SWIFT FOX STATUS AND MONITORING

Minette Johnson, Defenders of Wildlife: Goals were to reintroduce swift fox onto the reservation and expand swift fox range in Montana; explained background and justification for the project; Defenders used swift fox left in the Cochrane captive facility; released foxes following Craig Knowles' evaluation of site; captive foxes had opportunity to learn, with exposure to avian predators and live prey; released in August and September using A-frame structures, which were removed after 10 days.

In 1998, released 30 juveniles; 8 paired the first year; in 1999 11 released (8 radioed); in 2000 31 released (16 radioed); in 2001 25 released; in 2002 22 released; 122 total released in 5 years; reproduction documented every year since 1999; in 2000 5 natal den sites were found (6 in 2001, 8 in 2002); involved tribal members in project; distribute brochure to solicit sightings of swift fox.

An independent review of the project was conducted last year. This included interviews about success of project. Recommendations included such things as an oversight committee; focus is now on monitoring foxes rather than additional releases; trapped foxes to radio them and took samples that could be contributed to the repository. The Executive Summary of the independent review should be available soon; apparently the entire review will not be made public.

University of Montana has begun a study to evaluate the project's success; doing most radio monitoring from the air; have tried hairsnagging studies to determine distribution – no results yet; no coyote control done in association with their reintroduction; having some difficult in learning about dispersed foxes and often hear of them as roadkills. During a recent trapping effort to radio animals, all captures were juveniles; these plus the other 6 will be monitored weekly by a tribal member; they also have commissioned habitat evaluations of Fort Belknap, Fort Peck, and Northern Cheyenne reservations for potential reintroductions in addition to some private land evaluations.

Action Item: Grenier: If provided, each annual report should include reintroduction site updates. Agreement from the group that requests should be made each year by the annual report editor.

STATUS OF CANADIAN/MONTANA REINTRODUCED SWIFT FOX POPULATION, COMMENTS ON REINTRODUCTION TECHNIQUES, AND CANADIAN PRIORITIES FOR FUTURE RESEARCH AND CONSERVATION

Axel Moehrenschlager, Co-Chair, Canadian Swift Fox Recovery Team: Canadian Species at Risk Act (SARA) requires a species assessment in Canada; current swift fox status is endangered, previously extirpated in 1930s; 942 animals released in Canada; see recent publication in Animal Conservation; Wyoming foxes were hard released in Alberta and Saskatchewan; 29 foxes were radiotracked for 3 years and 48 resident foxes were also radioed and tracked; saw immediate and distant dispersals; total movement distances were much greater for adults than juveniles; males survived better; distant dispersal resulted in greater mortality; animals with pups traveled shorter distances; seasonal survival was similar between translocated and resident foxes during the first year; recommend soft releases to minimize dispersal and to increase survival; recommend using juveniles (smaller dispersals) for translocations to reduce impact on source population; use more females than males to establish balanced sex ratio; releases stopped in 1997.

International swift fox census was conducted in 2000-2001 to determine demographic changes, population viability, etc.; reviewed previous swift fox census in Canada in 1996-97; sampled the same area in 2000-01, with the addition of Montana; had a higher number of captures and greater distribution of captures in 2000-2001, with filling of peripheral habitats and filling in between the two previous subpopulations; female-biased population in 2000-2001 compared to previous survey; significant differences between subpopulations in population growth; capture rates tripled over 1996-97 work.

Eleven of 21 captured foxes were positive for canine distemper, but at fairly low titer levels; all were positive for canine parvo and at high titer levels; hope to do additional disease sampling and superimpose on genetics work.

Threats to swift and kit fox: habitat loss and intraguild competition/predation; to address the habitat issue, they are working on a Habitat Selection Model to help explain presence/absence of foxes and predict suitable sites for future releases; have 13 variables in the model.

With passage of Canadian Species At Risk Act (SARA), a swift fox plan must be completed within 1 year, which will include identification of threats, critical habitat, and examples of destructive activities; working on draft recovery strategy goal, hope to reach species of concern category in 15 years.

CANID TAXON ADVISORY GROUP (TAG)

Karen Bauman, St. Louis Zoo, serves as the Canid TAG's interim swift fox coordinator: TAG includes canids and hyaenids; oversee captive conservation programs; responsible for these species in American Zoo and Aquarium Association (AZA) zoos; facilitate communication/exchange between wildlife community and zoos; regional collection plans are required, including space, program evaluation, and review of IUCN CSG recommendations; programs should have a purpose, such as a link to conservation efforts.

Currently have 60 swift fox in 18 AZA institutions, with lots of interest in swift fox; most animals are still "owned" by Fort Worth Zoo; swift fox don't have a program structure, such as species survival plans (SSP), therefore, the Fort Worth Zoo retained ownership of the foxes to provide some program structure; there is a loose breeding moratorium and nondeacquisition policy in effect with swift fox, meaning that they should not have been bred or transferred; there were 17 founder animals, with 95% genetic diversity; AZA can offer captive breeding and husbandry expertise, education opportunities, technique development, and model for other fox species.

Questions: Is there still merit in maintaining a captive population? If so, what would be role and scope of captive population? How do we envision coordination effort and working relationship?

TAG would like to coordinate zoo swift fox efforts; studbook keeper and program manager would be named; level of involvement will depend on SFCT definition of purpose of the captive animals.

At present, swift fox are managed under a population management plan (PMP), with no mandatory enforcement; a studbook is maintained, but management decisions are voluntary.

Potential for disease research on captive animals, to try new reintroduction techniques, such as fostering animals; if any of these ideas have merit, it is likely better to deal with institutions willing to operate under SSP regulations; if swift fox becomes an SSP species, this would cover all swift fox currently in captivity in AZA facilities with mandatory compliance; current captive swift fox also present an opportunity for genetics analysis.

Should the captive population continue to exist? If so, what is its purpose? Canid TAG's next meeting will be held in spring, 2004.

Action Item: Gober and Grenier will draft the captive population's purpose/justification and solicit additional input. Team's position should be consistent with previous discussions; i.e., support for captive populations does not necessarily endorse their use for reintroductions.

STATUS OF ASSIGNED TASKS FROM 2002 MEETING:

All – contribution letters to send to NFWF – done
Address list – done

Habitat management brochure for landowners – Lu Carbyn and others volunteered at the 2002 meeting - not completed; Julianne offered to work on it with Matt Peek, Lu and Richard Bischof.

Request disease update from Beth Williams – Lu volunteered at 2002 meeting, unknown if completed; Fred Lindzey will make the contact.

Contact parasite specialist at UNL Museum (Scott Gardner) – completed by Richard Bischof.

Issue of NRCS representative on SFCT Team - Gerald Jasmer, NRCS in Nebraska, has moved to Casper, Wyoming as State Director. We should request another NRCS representative. Francie will ask Colorado NRCS person for advice or their new CDOW people for assistance. Need to develop swift fox habitat document, including BMPs, etc., for NRCS.

FS and BLM letters requesting involvement with swift fox planning efforts - Grenier: Several states followed-up with letters. Wyoming's BLM representative is very interested in more specific information on best management practices for swift fox. These needs would be met by the various habitat brochures being proposed (target audiences - landowners and NRCS personnel). Discussion about best information tools to help agencies make land-use planning decisions. Need to have a set of general guidelines that could be tailored for specific sites and states.

Annual report editor, 2003 – Martin Grenier and Heather Whitlaw.

TNC rank changes – Pete and Brian worked on it, but changes still need to be made to the information posted by Nature Serve (science arm of The Nature Conservancy); ex: for Minnesota, swift fox is state extirpated (SX), and swift fox were likely never anything but accidental in the state; states should check whether their state ranks are accurate. These ranks are assigned by the respective heritage program staff, so if inaccurate ranks are found, SFCT members should consult with their state/provincial heritage program's zoologist.

New Mexico pelt tagging – Chuck Hayes; Terry Enk will check whether Chuck investigated the possibility of introducing swift fox pelt tagging requirements or a specific harvest survey for New Mexico.

General discussion about funding: Where are we with NFWF? All previous money is gone. NFWF provided only ½ of what was requested. Is there any match left among states or other cooperators? Could we provide additional state match dollars to get additional NFWF funding?

Action Item: Richard should contact NFWF to see if project can be extended, using Colorado's state funds as the nonfederal match. Unsure who is best contact person (Brian Ocepek is no longer with NFWF) – possibly Ezra Neal, San Francisco, or Beth DeCarlos. Probably will be easier to extend a grant than to submit a new grant proposal. Marsha will contact Richard to get things rolling.

Gober: suggested that we consider gathering information on the amount spent on swift fox each year, similar to what has been done with black-footed ferret expenditures. Annual report could include description of expenditures and funding needs. Another funding option may be the International Association of Fish and Wildlife Agencies.

Discussion about how best to address rangewide funding needs, such as present NFWF project. Need for states to try to plan ahead for matching needs, assuming SFCT can identify future project ideas in time for budget planning.

Misc.:

Gober: distributed an excerpt from a Ph D dissertation by Nicole Rosemarino regarding the definition of a significant portion of range (ex:40% used in USFWS document to remove swift fox from candidate list).

Ermer: distributed a copy of an article that appeared in the Trapper and Predator Caller magazine regarding the comeback of the swift fox and trapper interest in swift fox.

Bob Hodorff, U.S. Forest Service, asked whether all SFCT members would like to review Forest Service management documents dealing with swift fox. The suggestion was made that they be shared with the SD team member. Giddings also expressed an interest in reviewing the documents.

CONSERVATION STRATEGY OBJECTIVES AND ACTION ITEMS:

Handout: list of high, medium, and low priority action items scheduled to be completed in 2002 and 2005. This agenda item was not discussed in detail. Those issues handled during other portions of the meeting are listed below.

The Team was not able to discuss if strategies, objectives, etc should be added, deleted, or modified. This agenda item and the issue of expanding populations/reintroductions will be handled through Team coordination or at the next annual meeting.

6.1.1 Each state wildlife agency will coordinate with the federal and state land management agencies to evaluate current levels of legal protection of native grasslands located within federal and state ownership- by 2004.

- letters were sent to BLM offices, still need letters to be sent to Forest Service, habitat brochure and guidelines need to be developed

6.1.3 Each state is to identify and delineate habitat corridors and surrounding areas between habitat blocks through mapping to direct conservation measures, agreements or enhancement efforts (no timetable specified).

- habitat project (NPWRC, Marsha Sovada); send out annual reminder to each state to send Marsha previous year's records.

4.1.2 Technical committee to resolve taxonomic issues and investigate the genetic integrity of the US swift fox population

- invite J. Dragoo and opposing view to write position paper.

Next meeting: Undetermined. Mike Fritz will propose that the Prairie Dog Conservation Team meet in Lincoln in February or March 2005. This is a potential plan for SFCT's next meeting, since several people can more easily attend if these two team meetings are held together.

Meeting ended at 5:20 p.m.

Meeting notes finalized and approved on October 22, 2003.

Table 1. Swift Fox Conservation Team 2003 Annual Meeting Participants.

Jacquie Ermer	ND Game and Fish Dept.	jermer@state.nd.us
Marsha Sovada	USGS – Northern Prairie Wildlife Research Center	marsha_sovada@usgs.gov
Julianne Hoagland	OK Dept. of Wildlife Conservation	jhoagland@odwc.state.ok.us
Heather Whitlaw	TX Parks and Wildlife	Heather.Whitlaw@tpwd.state.tx.us
Martin Grenier	WY Game and Fish Dept.	mgreni@state.wy.us
Pete Gober	US Fish and Wildlife Service	Pete_gober@fws.gov
Minette Johnson	Defenders of Wildlife	mjohnson@defenders.org
Eileen Dowd Stukel	SD Game, Fish and Parks Dept.	eileen.dowdstukel@state.sd.us
Brian Giddings	MT Fish, Wildlife and Parks Dept.	bgiddings@state.mt.us
Bob Hodorff	US Forest Service	rhodorff@fs.fed.us
Mike Fritz	NE Game and Parks Commission	mfritz@ngpc.state.ne.us
Karen Bauman	St. Louis Zoo, Canid TAG	kbauman@stlzoo.org
Matt Peek	KS Dept. of Wildlife and Parks	mattp@wp.state.ks.us
Axel Moehrenschlager	Calgary Zoo	axecyn@telusplanet.net axelm@calgaryzoo.ab.ca
Pat Fargey	Parks Canada – Grasslands National Park	pat.fargey@pc.gc.ca
Terry Enk	NM Game and Fish Dept.	tenk@state.nm.us
Kyran Kunkel	Turner Endangered Species Fund	kyran@montana.net
Fred Lindzey	USGS, University of Wyoming	flindzey@uwyo.edu
Cal McCluskey	Bureau of Land Management	cal_mccluskey@blm.gov
Jonathan Proctor	Predator Conservation Alliance	jonathan@predatorconservation.org
Jeff Green	USDA, APHIS Wildlife Services	jeffrey.s.green@aphis.usda.gov
Allison Puchniak	MT Fish, Wildlife and Parks Dept.	apuchniak@state.mt.us
Roxanne Falise	BLM, MT/Dakotas	roxanne_falise@blm.gov
Dave Roberts	BLM, Wyoming	dave_a_roberts@blm.gov
Shawn Sartorius	US Fish and Wildlife Service, MT	shawn_sartorius@fws.gov
William Gill	US Fish and Wildlife Service, KS	william_gill@fws.gov
Cara Meinke	USGS, BRD FRESC	cara_meinke@usgs.gov